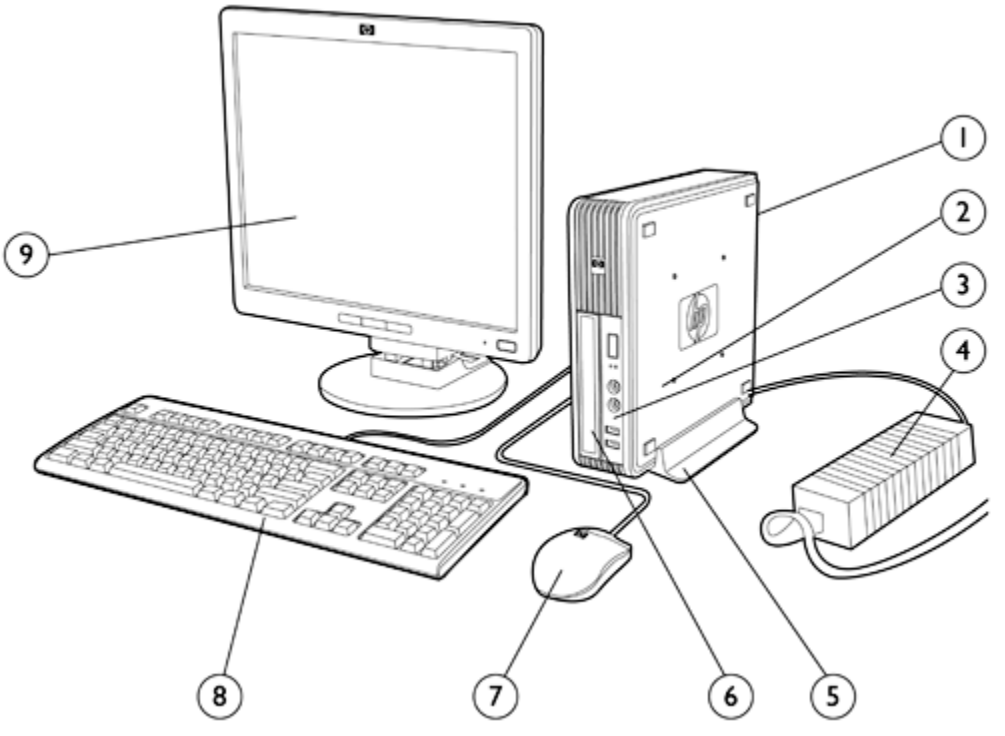
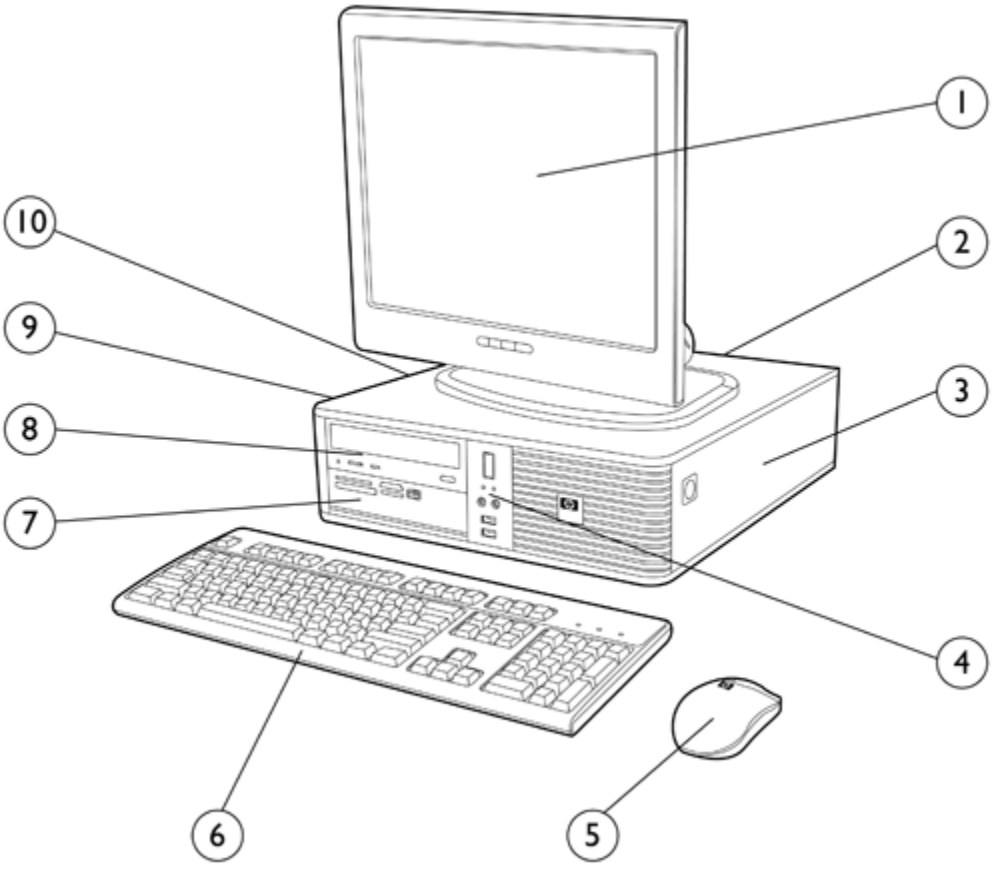
Ultra-slim Desktop



1. Rear I/O: (6) USB 2.0, (1) DisplayPort, (2) PS/2, (1) RJ-45, (1) VGA port, (1) audio in, (1) audio out
2. (1) 2.5” internal hard disk drive bay
3. Front I/O: (2) USB 2.0, headphone and microphone
4. 135W 87% efficient external power adapter
5. Tower stand (sold separately)
6. (1) Optical disk drive (slimline)
7. HP 2-button optical scroll mouse
8. HP keyboard
9. HP Monitor (sold separately)

Overview

Small Form Factor



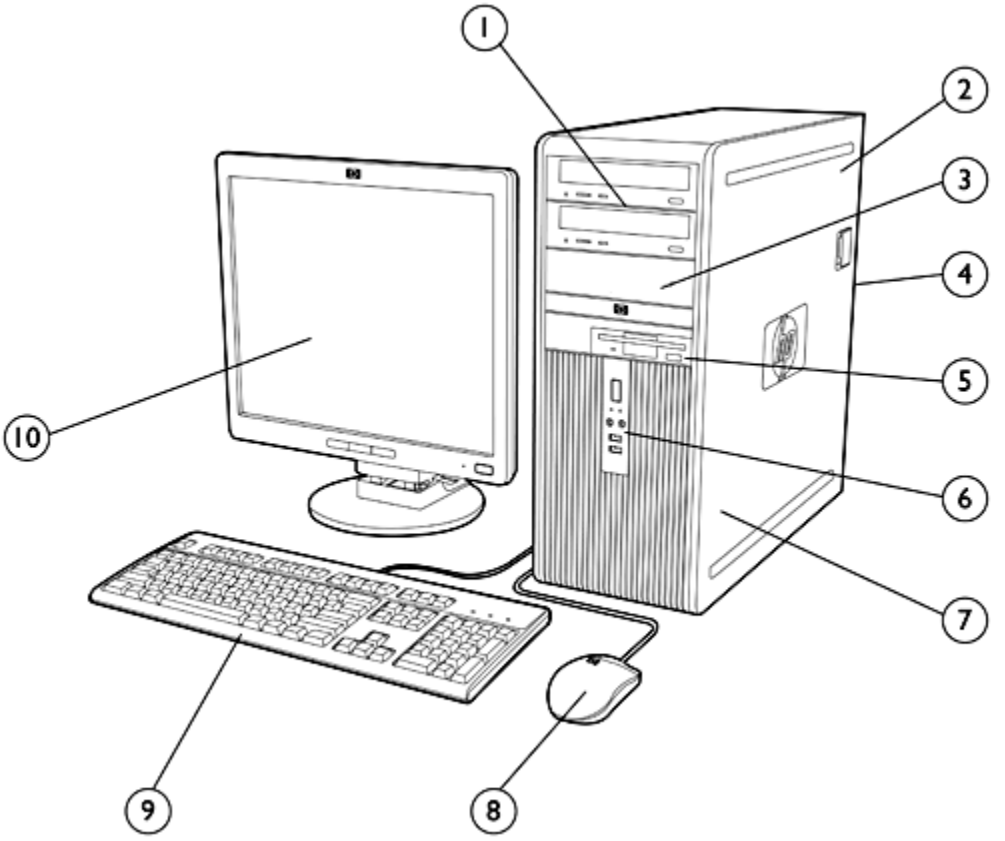
1. HP Monitor (sold separately)
2. Rear I/O: (6) USB 2.0, (1) serial port, (2) PS/2, (1) RJ-45, (1) VGA port, (1) DisplayPort, (1) audio in, (1) audio out

   Optional: 2nd serial port, (1) parallel port, (1) eSATA port
3. (1) low profile PCI slot, (1) low profile PCI Express x1 slot, (2) low profile PCI Express x16 slots (**NOTE:** 2nd x16 slot has x4 connectivity.)
4. Front I/O: (2) USB 2.0, headphone and microphone
5. HP 2-button optical scroll mouse
6. HP keyboard
7. (1) 3.5-inch external drive bay supporting media card reader, diskette drive, or secondary hard disk drive
8. (1) Optical disk drive
9. (1) 3.5-inch internal drive bay supporting primary hard disk drive
10. 240-watt standard efficiency power supply

    Optional: 85% efficient energy saving power supply

Overview

Convertible Minitower



1. (2) Optical disk drives
   (2) 3.5” internal hard disk drive bays
2. 365-watt standard efficiency power supply, Active Power Factor Correction (PFC)

   Optional: 85% efficient energy saving power supply
3. (1) 5.25” removable media drive bay
4. Rear I/O: (6) USB 2.0, (1) serial port, (2) PS/2, (1) RJ-45, (1) VGA, (1) DisplayPort, (1) audio in, (1) audio out

   Optional: 2nd serial port, (1) parallel port, (1) eSATA port
5. Media card reader or Floppy disk drive
6. Front I/O: (2) USB 2.0, headphone and microphone
7. (3) full-height PCI slots, (1) full-height PCI Express x1 slot, (2) full-height PCI Express x16 slots
   (**NOTE:** 2nd x16 slot has x4 connectivity.)
8. HP 2-button optical scroll mouse
9. HP keyboard
10. HP Monitor (sold separately)

Overview

At A Glance

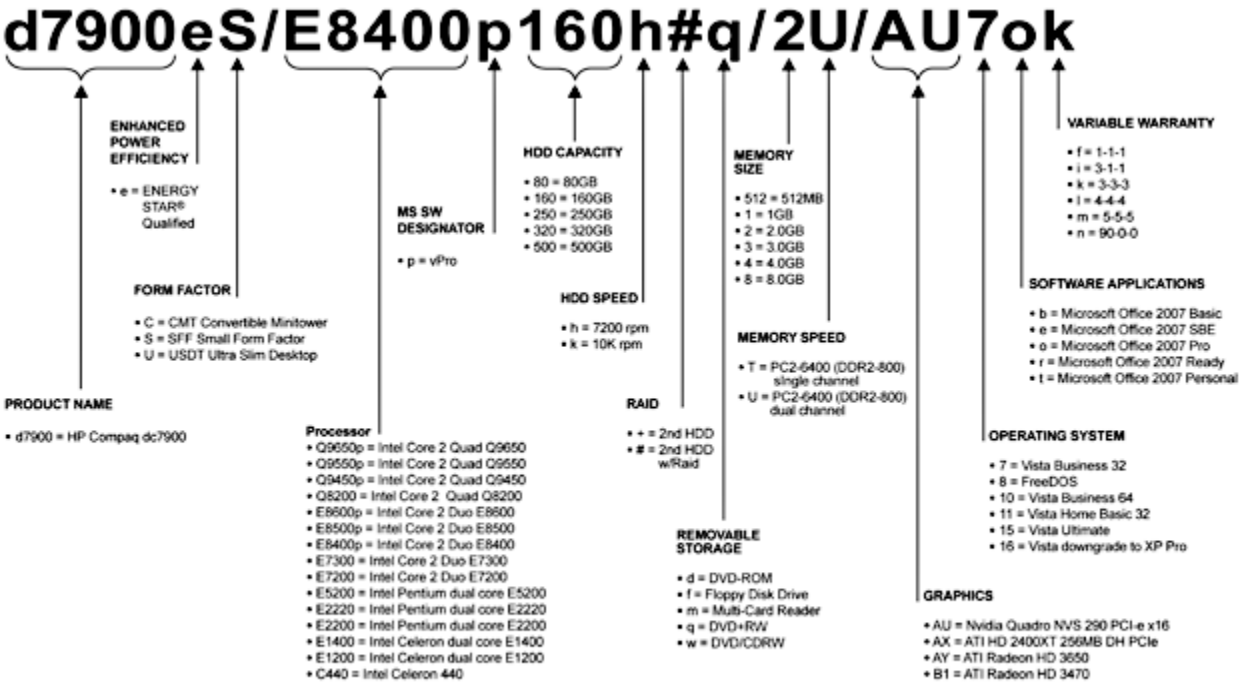
- Designed for long-term deployment within commercial and institutional organizations
- Guaranteed lengthy purchase lifecycles and image stability
- Integrated dual independent monitor support via both a VGA and DisplayPort monitor interface
- Optional 85% efficient power supplies
- ENERGY STAR qualification for dc7900e models
- Intel® Q45 Express chipset featuring Intel's Graphics Media Accelerator 4500
- Software image fully compatible across all models and form factors
- BIOS developed and engineered by HP for better security, manageability and software image stability
- Created using industry leading Design for Environment standards
- Supports industry standard management protocols including DASH, Intel Standard Manageability, and Intel Core 2 Processor with vPro Technology (on select models)
- CMT and SFF models can be configured with multiple hard disk drives in a RAID array
- Selected configurations with global availability easily set up and ordered through HP.com Business to Business portals (http://h10019.www1.hp.com/business-site/index.html)
- Tailored HP Factory Express deployment and lifecycle services available (http://h71028.www7.hp.com/enterprise/cache/97688-0-0-225-121.aspx)
- Protected by HP Services, including standard warranties up to 5-5-5 (terms and conditions vary by country; certain restrictions and exclusions apply)
- Tool-less serviceability features for easier upgrades and repairs
- Choice of professional chassis form factors to accommodate the desired mix between expandability and size

* TPM module and cryptographic software disabled where use is restricted by law; for example, Russia and China.

Configurable Components - Select Models (localized by Regions)

Model Key and Example

NOTE: This diagram is an example that illustrates how to read the model number. It is not intended to give every available configuration choice specified in the body of this document and may include references to modules that are out of date and no longer available.


d7900eS/E8400p160h#q/2U/AU7ok
PRODUCT NAME
• d7900 = HP Compaq dc7900
ENHANCED POWER EFFICIENCY
• e = ENERGY STAR® Qualified
FORM FACTOR
• C = CMT Convertible Minitower
• S = SFF Small Form Factor
• U = USDT Ultra Slim Desktop
Processor
• Q9650p = Intel Core 2 Quad Q9650
• Q9550p = Intel Core 2 Quad Q9550
• Q9450p = Intel Core 2 Quad Q9450
• Q8200 = Intel Core 2 Quad Q8200
• E8600p = Intel Core 2 Duo E8600
• E8500p = Intel Core 2 Duo E8500
• E8400p = Intel Core 2 Duo E8400
• E7300 = Intel Core 2 Duo E7300
• E7200 = Intel Core 2 Duo E7200
• E5200 = Intel Pentium dual core E5200
• E2220 = Intel Pentium dual core E2220
• E2200 = Intel Pentium dual core E2200
• E1400 = Intel Celeron dual core E1400
• E1200 = Intel Celeron dual core E1200
• C440 = Intel Celeron 440
MS SW DESIGNATOR
• p = vPro
HDD CAPACITY
• 80 = 80GB
• 160 = 160GB
• 250 = 250GB
• 320 = 320GB
• 500 = 500GB
HDD SPEED
• h = 7200 rpm
• k = 10K rpm
RAID
• + = 2nd HDD
• # = 2nd HDD w/Raid
REMOVABLE STORAGE
• d = DVD-ROM
• f = Floppy Disk Drive
• m = Multi-Card Reader
• q = DVD+RW
• w = DVD/CDRW
MEMORY SIZE
• 512 = 512MB
• 1 = 1GB
• 2 = 2.0GB
• 3 = 3.0GB
• 4 = 4.0GB
• 8 = 8.0GB
MEMORY SPEED
• T = PC2-6400 (DDR2-800) single channel
• U = PC2-6400 (DDR2-800) dual channel
GRAPHICS
• AU = Nvidia Quadro NVS 290 PCI-e x16
• AX = ATI HD 2400XT 256MB DH PCIe
• AY = ATI Radeon HD 3650
• B1 = ATI Radeon HD 3470
OPERATING SYSTEM
• 7 = Vista Business 32
• 8 = FreeDOS
• 10 = Vista Business 64
• 11 = Vista Home Basic 32
• 15 = Vista Ultimate
• 16 = Vista downgrade to XP Pro
SOFTWARE APPLICATIONS
• b = Microsoft Office 2007 Basic
• e = Microsoft Office 2007 SBE
• o = Microsoft Office 2007 Pro
• r = Microsoft Office 2007 Ready
• t = Microsoft Office 2007 Personal
VARIABLE WARRANTY
• f = 1-1-1
• i = 3-1-1
• k = 3-3-3
• l = 4-4-4
• m = 5-5-5
• n = 90-0-0

Standard Features and Configurable Components

Operating System - One of the following	**Preinstalled**	Genuine Windows Vista Business 32*
		Genuine Windows Vista Business 64*
		Genuine Windows Vista Home Basic 32*
		Genuine Windows Vista Ultimate 32*
		Genuine Windows Vista Business with downgrade to Windows XP Professional custom installed *+
		FreeDOS†
	Supported	Genuine Windows XP Home Edition
		Genuine Windows XP Professional
	Certified	SUSE Linux Enterprise Desktop†

* Certain Windows Vista product features require advanced or additional hardware. See: www.microsoft.com/windowsvista/getready/hardwarereqs.mspx and www.microsoft.com/windowsvista/getready/capable.mspx for details. WindowsVista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: www.windowsvista.com/upgradeadvisor.

+ Windows Vista Business disk may be included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is expected to order at least 25 customer systems with the same custom image.

† The following features are not supported on Linux certified systems:

- HP 22-in-1 Media Card Reader
- HP 1.44-MB External USB Diskette Drive
- TPM 1.2 Security Chip
- Intel Pro 1000 PT PCIe x1 Gigabit NIC
- Broadcom NetXtreme Gigabit Ethernet Plus PCIe NIC
- HP 802.11b/g/n Wireless PCIe x1 Card (SFF and MT)
- Intel WiFi Link 5100 a/b/g/n (USDT) Wireless NIC
- Agere PCI 56K International SoftModem
- LSI PCIe x1 56K International SoftModem
- ATI Radeon 3470 256MB SH PCIe x16 graphics card
- ATI Radeon HD 2400XT 256MB DH PCIe x16 graphics card
- ATI Radeon HD 3650 512MB DH PCIe x16 graphics card
- NVIDIA Quadro NVS 290 256MB dual head graphics adapter
- HP USB Smartcard Keyboard
- HP 2nd Serial Port
- Parallel port adapter
- eSATA port adapter
- HP FireWire / IEEE 1394 PCI Card

Value-added Software (included with all models; not included with FreeDOS)	HP ProtectTools Security Suite†	HP Software Management Agent
	HP Backup and Recovery Manager	PDF Complete
	HP Insight Diagnostics	Computrace for Desktops (in the HP BIOS)*

† Not included on models configured with less than 1 GB system memory.

* Computrace agent is in HP BIOS. For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.

Standard Features and Configurable Components

Value-added Software (included with select models; not included with FreeDOS)

- Computer Setup Utility
- McAfee Total Protection Anti-Virus†*
- Sonic/Roxio Easy Media Creator 9 or Roxio Business Creator 10
- HP Power Manager v2.0
- HP Total Care Advisor†
- Microsoft Office 2007 Basic
- Microsoft Office 2007 Personal
- Microsoft Office 2007 Professional
- Microsoft Office 2007 Small Business
- Microsoft Works 8.5
- Firefox-HP Virtual Browser
- Corel WinDVD 8

† Not included on models configured with less than 1 GB system memory.

* 60 day trial period for McAfee Total Protection for Small Business software. Internet access required to receive updates. First update included. Subscription required for updates thereafter.

HP Client Management Solutions (available for free download from the Web http://www.hp.com/go/easydeploy)

- HP Client Configuration Manager Basic Edition
- HP Client Manager for Altiris
- HP SoftPaq Download Manager
- HP Client Catalog for Microsoft SMS
- HP Out-of-Band Management Console (for Intel management technology enabled models)
- Altiris Out-of-Band Management Solution (for Intel AMT enabled models)
- HP Systems Software Manager

Value-added Services and Features

- HP Stable Platform Program
- Business-to-Business Portals
- HP Global Series Services
- TPM 1.2 security module*
- Factory Express Deployment and Lifecycle Services
- Intel Standard Manageability
- Intel Core 2 processor with vPro Technology

* TPM module disabled where use is restricted by law; for example, Russia.

Service and Support

On-site Warranty and Service[1]: This three-year (3-3-3), limited warranty and service offering delivers three years of parts, labor and on-site repair. Response time is next business-day[2] and includes free telephone support[3] 24 x 7. Global coverage[2] ensures that any product purchased in one country and transferred to another non-restricted country will remain fully covered under the original warranty and service offering. Some countries/regions do not offer one year onsite and labor.

[1] Terms and conditions may vary by country. Certain restrictions and exclusions apply.

[2] On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

[3] Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Standard Features and Configurable Components

	Ultra-slim Desktop	Small Form Factor	Convertible Minitower
Dimensions			
Chassis Dimensions (H x W x D)	2.60 x 9.90 x 10 in (66.0 x 251.5 x 254 mm)	3.95 x 13.3 x 14.9 in (100.3 x 337.8 x 378.5)	17.63 x 7.0 x 17.8 in (447.8 x 177.8 x 452.12 mm)
Optional Tower Stand Dimensions (H x W x D)	1.26 x 4.82 x 6.69 in (32.0 x122.3 x 170.0 mm)	1.05 x 6.95 x 7.83 in (26.75 x 176.46 x 198.87 mm)	N/A
System weight*	7.0 lb (3.18 kg)	18.75 lb (8.50 kg)	26.2 lb (11.89 kg)
System volume	4.21 liters	13 liters	36 liters
Shipping weight*	14.34 lb (6.52 kg)	26.10 lb (11.86 kg)	34.60 lb (15.72 kg)
Maximum supported weight (desktop orientation)	77.1 lb (35 kg)	77.1 lb (35 kg)	77.1 lb (35 kg)
Shipping box dimensions (H x W x D)	8.60 x 15.68 x 19.68 in (218.4 x 398.3 x 499.9 mm)	9.00 x 19.68 x 23.38 in (228.6 x 499.9 x 593.85 mm)	24.25 x 12.33 x 22.13 in (616.0 x 313.2 x 562.1 mm)
* Configured with 1 hard drive, 1 optical drive, no diskette drive, and no PCI card.			

	Ultra-slim Desktop	Small Form Factor	Convertible Minitower
Standard Efficiency Power Supply	N/A	240W active PFC	365W active PFC
Energy Efficient Power Supply	135W active PFC 87% efficient	240W active PFC 85% efficient	365W active PFC 85% efficient
	External power supply dimensions: 6.7 x 2.6 x 1.5 in Total length of external power supply and power cord: 12 feet 8 inches		
Ports			
USB 2.0	(8) Total (2) front, (6) rear		
Serial	N/A	(1) Standard Optional 2nd port available	
Parallel	N/A	Optional (1)	
eSATA	N/A	Optional (1)	
PS/2	(1) keyboard; (1) mouse		
Video	(1) VGA; (1) DisplayPort		
DVI output	available via ADD2 card or optional DisplayPort to DVI adapterr		
Support for Multi-Monitor	Integrated dual independent monitor support standard; > 2 via ADD2 card or optional graphics cards		
Audio	Front – mic and headphone Rear – input (supports microphone or line input), line out		
NIC (RJ-45)	Integrated Intel 82567LM GbE Network Connection		
Slots			
Type and quantity	(1) mini PCI Express	(1) PCI (1) PCI Express x1 (2) PCI Express x16	(3) PCI (1) PCI Express x1 (2) PCI Express x16
Slot specifications		• Accommodates low profile cards only • Graphics slots support 35W cards • 2nd PCIe x16 slot functions electrically as a x4	• Accommodates full height cards • 1st graphics slot supports 75W card; 2nd graphics slot support 35W card • 2nd PCIe x16 slot functions electrically as a x4

Standard Features and Configurable Components

		USDT	SFF	CMT
Chipset	Intel Q45 Express chipset featuring Intel GMA 4500 DirectX 10 graphics	X	X	X
Processor and Speed* One of the following	**Intel Celeron Processors:**			
	Intel Celeron 440 processor 2.0 GHz, 512 KB L2 cache, 800 MHz FSB	X	X	X
	Intel Celeron 450 processor 2.2 GHz, 512 KB L2 cache, 800 MHz FSB	X	X	X
	Intel Celeron Dual-Core Processors:			
	Intel Celeron dual-core E1200 processor 1.6 GHz, 512 KB L2 cache, 800 MHz FSB	X	X	X
	Intel Celeron dual-core E1400 processor 2.0 GHz, 512 KB L2 cache, 800 MHz FSB	X	X	X
	Intel Celeron dual-core E1500 processor 2.2 GHz, 512 KB L2 cache, 800 MHz FSB	X	X	X
	Intel Celeron E1600 processor 2.4-GHz, 512K L2 cache, 800-MHz FSB		X	X
	Intel Pentium dual-core Processors:			
	Intel Pentium dual-core E2200 processor 2.2 GHz, 1 MB L2 cache, 800 MHz FSB	X	X	X
	Intel Pentium dual-core E2220 processor 2.4 GHz, 1 MB L2 cache, 800 MHz FSB	X	X	X
	Intel Pentium dual-core E5200 processor 2.5 GHz, 2 MB L2 cache, 800 MHz FSB	X	X	X
	Intel Pentium dual-core E5300 processor 2.6 GHz, 2 MB L2 cache, 800 MHz FSB	X	X	X
	Intel Pentium dual-core E5400 processor 2.70 GHz, 2 MB L2 cache, 800 MHz FSB	X	X	X
	Intel Pentium E6300 Processor 2.80-GHz, 2MB L2 cache, 800-MHz FSB		X	X
	Intel Core 2 Duo Processors:			
	Intel Core 2 Duo E7200 processor 2.53 GHz, 3 MB L2 cache, 1066 MHz FSB	X	X	X
	Intel Core 2 Duo E7300 processor 2.66 GHz, 3 MB L2 cache, 1066 MHz FSB	X	X	X
	Intel Core 2 Duo E7400 processor 2.80 GHz, 3 MB L2 cache, 1066 MHz FSB	X	X	X
	Intel Core 2 Duo E7500 Processor 2.93 GHz, 3 MB L2 cache, 1066 MHz FSB	X	X	X
	Intel Core 2 Duo E7600 Processor 3.06-GHz, 3 MB L2 cache, 1066-MHz FSB		X	X
	Intel Core 2 Duo E8300 processor 2.83 GHz, 6 MB L2 cache, 1333 MHz FSB	X	X	X
	Intel Core 2 Duo E8400 processor 3.0 GHz, 6 MB L2 cache, 1333 MHz FSB Featuring Core 2 Processor with vPro Technology	X	X	X
	Intel Core 2 Duo E8500 processor 3.16 GHz, 6 MB L2 cache, 1333 MHz FSB Featuring Core 2 Processor with vPro Technology	X	X	X

	Intel Core 2 Duo E8600 processor 3.33 GHz, 6 MB L2 cache, 1333 MHz FSB Featuring Core 2 Processor with vPro Technology	X	X	X
	Intel Core 2 Quad Processors:			
	Intel Core 2 Quad Q8200 processor 2.33 GHz, 4 MB L2 cache, 1333 MHz FSB		X	X
	Intel Core 2 Quad Q8300 processor 2.50 GHz, 4 MB L2 cache, 1333 MHz FSB		X	X
	Intel Core 2 Quad Q8400 Processor 2.66-GHz, 4 MB L2 cache, 1333-MHz FSB		X	X
	Intel Core 2 Quad Q9400 processor 2.66 GHz, 6 MB L2 cache, 1333 MHz FSB Featuring Core 2 Processor with vPro Technology		X	X
	Intel Core 2 Quad Q9550 processor 2.83 GHz, 12 MB L2 cache, 1333 MHz FSB Featuring Core 2 Processor with vPro Technology		X	X
	Intel Core 2 Quad Q9650 processor 3.0 GHz, 12 MB L2 cache, 1333 MHz FSB Featuring Core 2 Processor with vPro Technology		X	X
Intel Core 2 Processor with vPro Technology	All dc7900 Series models featuring this technology include processors which are part of the Intel 2008 Stable Image Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition of the HP Compaq dc7900 Series business desktop, thus making these model the most stable, secure, and manageable platforms available to enterprises today. The 2008 SIPP processors are: ● Core 2 Duo E8400, E8500, E8600 ● Core 2 Quad Q9400, Q9550, Q9650 Intel's Core 2 Processor with vPro Technology suite of features includes: ● **Intel Active Management Technology** an advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. Intel Active Management Technology includes all features described as part of Intel Standard Manageability plus the following advanced management functions: ○ **Fast Call for Help** – a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection ○ **Remote Scheduled Maintenance** – pre-schedule when the PC connects to the IT or service provider console for maintenance. Remote PCs can get required patches, be inventoried, etc by connecting to their IT console or Service Provider when it's convenient ○ **Remote Alerts** – automatically alert IT or service provider if issues arise ○ **Access Monitor** – Provides oversight into Intel® AMT actions to support security requirements ● **Microsoft NAP Support** Allows Intel Active Management Technology to gain access to a	X	X	X

Microsoft NAP enabled 802.1x network OOB to enable OOB SW updates, inventories, remote diagnostics, etc. NAP is a new platform and solution that controls access to network resources based on a client computer's identity and compliance with corporate governance policy. NAP allows network administrators to define granular levels of network access based on who a client is, the groups to which the client belongs, and the degree to which that client is compliant with corporate governance policy. If a client is not compliant, NAP provides a mechanism to automatically bring the client back into compliance and then dynamically increase its level of network access.

When a client attempts to access the network or communicate on the network, it must present its system health state or proof of health compliance. If a client cannot prove it is compliant with system health requirements (for example, that it has the latest operating system and antivirus updates installed), its access to the network or communication on the network can be limited to a restricted network containing server resources so that health compliance issues can be remedied. After the updates are installed, the client requests access to the network or attempts the communication again. If compliant, the client is granted unlimited access to the network or the communication is allowed.

Memory

DDR2 SYNCH DRAM NON-ECC MEMORY
Memory upgrades are accomplished by adding single or multiple DIMMs of the same or varied sizes. This chart does not represent all possible memory configurations. The HP Compaq dc7900 business desktop supports non-ECC DDR2 PC2-5300 (667-MHz) and PC2-6400 (800-MHz) memory.

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

HP recommends dual-channel symmetric configurations for maximum performance.
For best performance, add the same amount of total memory to each channel and do not mix speeds. For dual-channel symmetric performance, the total amount of memory in each channel must be equal. If speeds are mixed, speed will default to the slowest DIMM.

RAID

Redundant Array of Independent Drives

Flexible implementation:

- DriveLock is supported while in RAID mode. Users can manage DriveLock password from within F10 Setup. Locked drives will be displayed as such in the RAID option ROM interface.
- Hard drive information can be viewed within F10 Setup while in RAID mode. Previously, the hard drives will not appear in Drive Configuration when switching to RAID mode.
- DPS Self Test can be executed on physical hard drives while in RAID mode.
- The RAID Setup Utility (accessed through CTRL-I) can be protected by the F10 Setup password.

NOTE: RAID 1 is the only RAID configuration that HP Compaq dc7900 Business PC products offer as factory configurations. The pre-configured systems:

- Are only available on the CMT and SFF form factors. The USDT does not support RAID as it does not allow for more than one hard disk drive.
- Are complete RAID systems and have both drives installed.
-
-

- Have the necessary Option ROM configuration.
- Are pre-loaded and pre-installed with all required Intel software.
- Include a preinstalled operating system that is mirrored mode out of the box.

Please refer to the HP White Paper titled "Advanced Host Controller Interface (AHCI) and Redundant Array of Independent Disks (RAID) on HP Compaq dc7900 Business PCs" at http://www.hp.com for more information and instructions.

Ultra-slim Desktop

Maximum Memory* Supports up to 8 GB of DDR2 SYNCH DRAM using SO-DIMM modules. Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.
NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements.

SO-DIMM Size	Slot	
	Channel A	**Channel B**
	1 (black)	**2** (white)
512-MB	512-MB	
1-GB	1-GB	
2-GB (dual-channel symmetric)	1-GB	1-GB
4-GB (dual channel symmetric)	2-GB	2-GB
8-GB maximum (dual channel symmetric)	4-GB	4-GB

* The Intel Q45 Express chipset includes a built-in Management Engine (ME), which allocates memory for manageability functions. Management Engine memory is shared with system memory. If the PC contains a single SO-DIMM, 16 MB of memory is pre-allocated for it at system startup. If the PC contains two SO-DIMMs, 32 MB of memory is pre-allocated. This memory is not made available to the operating system, just as pre-allocated video memory is not available.

Small Form Factor and Convertible Minitower

Maximum Memory* Supports up to 16 GB of DDR2 SYNCH DRAM using DIMM modules. Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.
NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

DIMM Size	Slot			
	Channel A		**Channel B**	
	1 (black)	**2** (white)	**3** (white)	**4** (white)
512-MB	512-MB			
1-GB	1-GB			
2-GB (dual-channel symmetric)	1-GB		1-GB	
4-GB (dual-channel symmetric)	1-GB	1-GB	1-GB	1-GB
8-GB (dual-channel symmetric)	2-GB	2-GB	2-GB	2-GB
16-GB maximum (dual-channel symmetric)	4-GB	4-GB	4-GB	4-GB

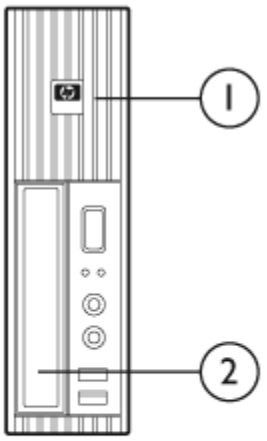
Standard Features and Configurable Components

* The Intel Q45 Express chipset includes a built-in Management Engine (ME), which allocates memory for manageability functions. Management Engine memory is shared with system memory. If the PC contains a single DIMM, 16 MB of memory is pre-allocated for it at system startup. If the PC contains two DIMMs, 32 MB of memory is pre-allocated. This memory is not made available to the operating system, just as pre-allocated video memory is not available.

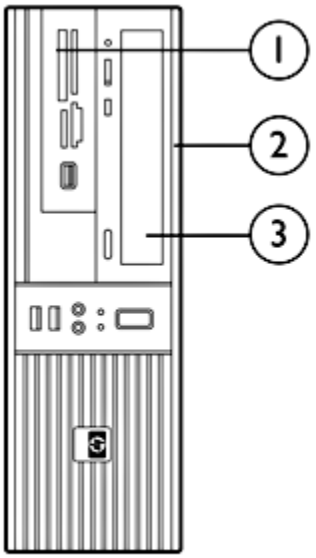
		USDT	SFF	CMT
Memory Configurations – One of the following	512-MB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (1 x 512)	X	X	X
	1-GB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (1 x 1GB)	X	X	X
	2-GB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (1 x 2GB)	X	X	X
	2-GB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (2 x 1GB)	X	X	X
	3-GB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (3 x 1GB)		X	X
	4-GB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (4 x 1GB)		X	X
	4-GB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (2 x 2GB)	X	X	X
	8-GB DDR2 Synch Dram PC2-6400 (800-MHz) Non ECC (4 x 2GB)		X	X
	16-GB DDR2 Synch Dram PC2-6400 (800-Mhz) Non ECC (4 x 4GB)		X	X

Expandability	USDT	SFF	CMT
PCI slots	N/A	(1) LP (2.5”), length (6.6”) standard; (2) FH (4.2”), length (6.875”) via optional riser card. **NOTE:** With optional riser card, PCIe x1 and PCIe x16 slots are not accessible.	(3) FH (4.2"), length (10.5”)
Max power per slot	N/A	25W	25W
PCI Express x16 slot (Also functions as SDVO/ADD2 Slot)	N/A	(2) LP (2.5”), length (6.6”)	(2) FH (4.2”), full-length
Max power per slot	N/A	35W	75W max if 1 16x slot, 35W each if both PCIe 16 slots
PCI Express x1 slot	N/A	(1) LP (2.5”), length (6.6”)	(1) FH (4.2”), full-length
Max power per slot	N/A	10W	10W
External Bays	(1) Total	(2) Total	(4) Total
3.5”	N/A	(1) unless used for a secondary hard drive	(1)
5.25”	N/A	(1) 8.189” length	(2) 8.189” length (1) 5.71” length
Slimline	128w x 127d x 12.7h mm	N/A	N/A
Internal 2.5” HDD Bays	(1)	N/A	N/A
Internal 3.5” HDD Bays	N/A	(1) for primary hard drive **NOTE:** Secondary hard drive can be installed in 3.5” external bay if not used for external device.	(2) dedicated for HDDs **NOTE:** A third hard drive can be installed in 3.5” external bay if not used for external device.
Hard Drive Controller (PCI) Supported	Serial ATA support for SATA 1.5-Gb/s and 3.0-Gb/s hard drives		
Hard Drive and Optical SATA Interfaces Supported	(1) Serial ATA interface	(3) Serial ATA interfaces (1) Serial ATA for eSATA	(4) Serial ATA interfaces (1) Serial ATA for eSATA
Host Controller for SATA	Advanced Host Controller Interface (AHCI) Revision 1.2. The specification includes a description of the hardware/software interface between system software and the host controller hardware.		

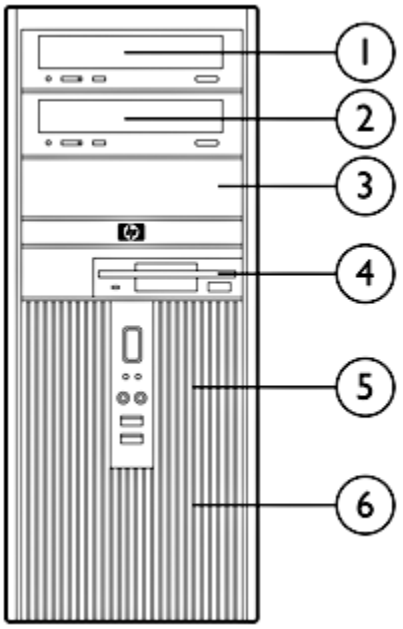
Ultra-slim Desktop



Small Form Factor



Convertible Minitower



Storage - Drive Support

	USDT		SFF			CMT		
	Slimline Optical Drives	2.5” Hard Disk Drive or Solid State Drive (right angle, no cable)	Diskette Drive or Media Card Reader	5.25” Optical Drives	Hard Disk Drives	Diskette Drive or Media Card Reader*	5.25” Optical Drives	Hard Disk Drives
Quantity Supported	1	1	1	1	2	1	2	3
Position Supported	(2)	(1)	(1)	(2)	(1), (3)	(4)	(1), (2)	(2)†, (5), (6)
Controller	SATA	SATA	Diskette Controller or USB header on PCA	SATA	SATA	Diskette Controller or USB header on PCA	SATA	SATA

* To have both a diskette drive and a media card reader in the Convertible Minitower, it is necessary to order it with a diskette drive in position 4 and then purchase a media card reader as an after-market option kit (which contains a 5.25" bracket) and install it in position 3.

† Installing a 3.5-inch hard drive in position #2 (a 5.25-inch optical drive bay) requires the optional HP Optical Bay HDD Mounting Bracket.

Standard Features and Configurable Components

		USDT	SFF	CMT
Hard Drives (SATA)	80 GB Hard Drive (2.5") 8MB cache, 7200 RPM, 3.0 GB/s, NCQ, Smart IV	X		
	160 GB Hard Drive (2.5") 8MB cache, 7200 RPM, 3.0 GB/s, NCQ, Smart IV	X		
	250 GB Hard Drive (2.5") 8MB cache, 7200 RPM, 3.0 GB/s, NCQ, Smart IV	X		
	80 GB Hard Drive 8MB cache, 7,200 RPM, 3.0 GB/s, NCQ, Smart IV		X	X
	80 GB Hard Drive 16MB cache, 10,000 RPM, 3.0 GB/s, NCQ, Smart III		X	X
	80 GB Hard Drive (removable) 8MB cache, 7,200 RPM, 3.0 GB/s, NCQ, Smart IV		X	X
	160 GB Hard Drive 8MB cache, 7,200 RPM, 3.0 GB/s, NCQ, Smart IV		X	X
	160 GB Hard Drive 16MB cache, 10,000 RPM, 3.0 GB/s, NCQ, Smart III		X	X
	160 GB Hard Drive (removable) 8MB cache, 7,200 RPM, 3.0 GB/s, NCQ, Smart IV		X	X
	250 GB Hard Drive 8MB cache, 7,200 RPM, 3.0 GB/s, NCQ, Smart IV		X	X
	250 GB Hard Drive (removable) 8MB cache, 7,200 RPM, 3.0 GB/s, NCQ, Smart IV		X	X
	500 GB Hard Drive 16MB cache, 7,200 RPM, 3.0 GB/s, NCQ, Smart IV		X	X
Removable Storage – One or more of the following depending on form factor (see Storage – Drive Support section above)	**Diskette Drives**			
	1.44-MB Diskette Drive		X	X
	5.25" Optical Drives (SATA)			
	DVD-ROM Drive		X	X
	SuperMulti LightScribe DVD Writer Drive[1,2,3]		X	X
	Slimline Optical Drives (SATA)			
	DVD-ROM Drive[1]	X		
	SuperMulti LightScribe DVD Writer Drive[1,2,3]	X		
	[1] For playing DVDs, Corel WinDVD 8 [2] For writing CDs, choice of Sonic/Roxio Easy Media Creator 9 or Roxio Business Creator 10 [3] For writing CDs and DVDs, video editing and authoring DVDs, choice of Sonic/Roxio Easy Media Creator 9 or Roxio Business Creator 10			
Media Card Reader – One of the following	HP 22-in-1 Media Card Reader		X	X
	HP 22-in-1 Media Card Reader with 1394 port		X	X

Standard Features and Configurable Components

Security	TPM 1.2 TPM Security Chip*	X	X	X
	TPM Pre-Boot Authentication (via BIOS)	X	X	X
	Smartcard Pre-boot Authentication (via BIOS)	X	X	X
	Stringent Security** (via BIOS)	X	X	X
	SATA port disablement (via BIOS)	X	X	X
	Drive Lock	X	X	X
	RAID configurations		X	X
	HP ProtectTools Embedded Security Software	X	X	X
	Serial, Parallel, USB Enable/Disable (via BIOS)	X	X	X
	Optional USB Port Disable at factory (user configurable via BIOS)	X	X	X
	Removable Media Write/Boot Control	X	X	X
	Power-On Password (via BIOS)	X	X	X
	Setup Password (via BIOS)	X	X	X
	Solenoid Hood Lock / Sensor		X	X
	HP Security Lock Kit	X	X	X
	Support for chassis padlocks and cable lock devices	X	X	X
	* TPM module disabled where use is restricted by law; for example, Russia. ** This setting is defaulted to disable, but when enabled, the PW jumper will not clear the BIOS pre-boot authentication passwords.			
NIC	Intel 82567LM GbE Network Connection (integrated on system board)	X	X	X
	Intel Gigabit CT Desktop NIC *		X	X
	Intel Pro 1000 PT PCIe Gigabit NIC *		X	X
	NOTE: The integrated network connection is required to support the vPro technology features. * Available after initial product release; use of this network card disables the vPro technology features.			
Wireless	HP 802.11 b/g/n PCIe x1 Wireless card		X	X
	Intel WiFi Link 5100 a/b/g/n (USDT) Wireless NIC	X		
	NOTE: These wireless network solutions disable the vPro technology features.			
Modem	Agere 2006 PCI 56K International SoftModem		X	X
	LSI PCIe x1 Hi-Speed 56K International SoftModem		X	X

Standard Features and Configurable Components

Graphics	Intel Graphics Media Accelerator 4500 (integrated on chipset)	X	X	X
	ATI Radeon 3470 256MB SH PCIe x16 graphics card		X	X
	ATI Radeon HD 2400XT 256MB DH PCIe x16 graphics card		X	X
	ATI Radeon HD 3650 512MB DH PCIe x16 graphics card			X
	ATI Radeon HD 4550 Dual Head PCIe x16 Graphics Card		X	X
	NVIDIA Quadro NVS 290 256MB DH PCIe x16 graphics card		X	X
	NVIDIA Quadro NVS 295 256MB Graphics Card		X	X
	HP ADD2 SDVO PCIe DVI-D adapter		X	X
	HP DisplayPort to VGA Adapter	X	X	X
Audio	Integrated HD audio with AD1884A codec (all ports are stereo)	X	X	X
	Microphone and Headphone front ports	X	X	X
	Line-out and Line-In rear ports*	X	X	X
	Multistreaming capable*	X	X	X
	Internal Speaker (standard)	X	X	X
	HP Thin USB Powered Speakers	X	X	X
	* Rear audio input ports are re-taskable as Line-in or Microphone-in. External speakers must be powered externally. Multistreaming can be enabled in the ADI control panel to allow independent audio streams to be sent to/from the front and rear jacks. This allows for different audio applications to use separate audio ports on the system. For example, the front jacks could be used with a headset for a communications application while the rear jacks are being used with external speakers and a multimedia application.			
Input Devices	**Keyboard**			
	HP PS/2 Standard Keyboard	X	X	X
	HP USB Standard Keyboard	X	X	X
	HP USB Smartcard Keyboard	X	X	X
	HP USB PS2 Washable Keyboard	X	X	X
	Mouse - One of the following			
	HP PS/2 2-button Optical Scroll Mouse	X	X	X
	HP USB 2-button Optical Scroll Mouse	X	X	X
	HP USB 2-Button Laser Scroll Mouse	X	X	X
Miscellaneous	HP FireWire (IEEE 1394) PCI Card		X	X
	PCI riser card for SFF - adds 2 full-height PCI slots **NOTE:** Low profile slots are unusable with riser card installed.		X	
	Serial port adapter		X	X
	Parallel port adapter		X	X
	eSATA port adapter		X	X
	Tower stand	X	X	
	Configure dc7900 CMT in desktop orientation			X
	Rear Port Control Cover	X		

After-Market Options (availability may vary by region)

		USDT	SFF	CMT	After-Market Options Part Number
Communications	**Wireless**				
	HP Wireless 802.11 b/g/n PCIe x1		X	X	FH971AA
	NICs				
	Broadcom NetXtreme Gigabit Ethernet Plus PCIe NIC		X	X	FS215AA
	Intel Gigabit CT Desktop NIC		X	X	FH969AA
	Intel Pro 1000 PT PCIe Gigabit NIC*		X	X	EH352AA
	Modem				
	LSI PCIe x1 Hi-Speed 56K International SoftModem		X	X	FH970AA
	HP RJ11 Modem Adapter Kit		X	X	DC131C#xxx
	* available after initial product release **NOTE:** The use of a PCI Express network card (wired or wireless) will disable the vPro technology features.				
Graphics	**Single head solutions**				
	ATI Radeon 3470 256MB SH PCIe x16		X	X	FH972AA
	Multi head solutions				
	ATI Radeon HD 2400XT 256MB DH PCIe x16		X	X	KD060AA
	ATI Radeon HD 3650 512MB DH PCIe x16			X	KS505AA
	ATI Radeon HD 4550 Dual Head PCIe x16 Graphics Card		X	X	AT042AA
	NVIDIA Quadro NVS 290 256MB DH PCIe x16		X	X	KG748AA
	NVIDIA Quadro NVS 295 256MB Graphics Card		X	X	FY943AA
Hard Disk Drives	**Serial ATA Hard Drives**				
	HP 80-GB SATA (NCQ/Smart IV) 3.0-Gb/s HDD		X	X	PY276AA
	HP 160-GB SATA (NCQ/Smart IV) 3.0-Gb/s HDD		X	X	PY277AA
	HP 250-GB SATA (NCQ/Smart IV) 3.0-Gb/s HDD		X	X	PY278AA
	HP 320-GB SATA (NCQ/Smart IV) 3.0-GB/s HDD		X	X	FH963AA
	HP 500-GB SATA (NCQ/Smart IV) 3.0-GB/s HDD		X	X	KW347AA
	HP eSATA Adapter		X	X	FH966AA
	HP Removable SATA Hard Drive Enclosure (Frame & Carrier)		X	X	RY102AA
	HP Removable SATA Hard Drive Enclosure (Carrier Only)		X	X	RY103AA
	HP Optical Bay HDD Mounting Bracket			X	NQ099AA

After-Market Options (availability may vary by region)

Input/Output Devices	HP PS/2 Standard Keyboard	X	X	X	DT527A
	HP USB Standard Keyboard	X	X	X	DT528A
	HP USB Gray Keyboard	X	X	X	DT529A
	HP USB PS2 Washable Keyboard	X	X	X	VF097AA#XXX
	HP 2.4 GHz Wireless Keyboard and Mouse	X	X	X	NB896AA#xxx
	HP PS/2 2-Button Optical Scroll Mouse	X	X	X	EY703AA
	HP USB 2-Button Optical Scroll Mouse	X	X	X	DC172B
	HP USB 2-Button Laser Mouse	X	X	X	GW405AA
Memory (non-ECC)	**PC2-6400 (DDR2, 800 MHz) DIMM**				
	HP 1 GB PC2-6400 (DDR2 800 MHz) DIMM		X	X	AH058AA
	HP 2 GB PC2-6400 (DDR2 800 MHz) DIMM		X	X	AH060AA
	HP 4 GB PC2-6400 (DDR2 800) DIMM		X	X	FH977AA
	PC2-6400 (DDR2, 800 MHz) SODIMM				
	HP 1 GB PC2-6400 (DDR2 800 MHz) SODIMM	X			GM254AA
	HP 2 GB PC2-6400 (DDR2 800 MHz) SODIMM	X			GV576AA
	HP 4 GB PC2-6400 (DDR2 800 MHz) SODIMM	X			FH978AA
Monitors	All HP monitors are supported that accept a graphics output provided by this PC. The LP3065 monitor can be supported by installing a graphics card that supports a dual-link DVI-D output.				
Multimedia	HP Thin USB Powered Speakers	X	X	X	KK912AA
Slimline Optical Drives	**DVD-ROM Drive**				
	HP Slim 8X SATA DVD-ROM Drive	X			FH967AA
	Combo Drive				
	HP Slim 24X SATA CD-RW/DVD-ROM Combo Drive	X			KV842AA
	DVD Writer				
	HP Slim 8X SATA SuperMulti LightScribe Drive	X			KV843AA
Standard Optical Drives	**DVD-ROM Drive**				
	HP SATA DVD-ROM Drive		X	X	AH047AA
	DVD Writer				
	HP SATA SuperMulti LightScribe DVD Writer Drive		X	X	GF343AA
Removable Storage	**Diskette and Digital Drives**				
	HP 1.44-MB External USB Diskette Drive	X	X	X	DC141B
	HP 1.44-MB Standard Internal Diskette Drive		X	X	AH053AA
	Multimedia				
	HP 22-in-1 Media Card Reader		X	X	FX273AA
	HP 22-in-1 Media Card Reader with FireWire (IEEE 1394)		X	X	KN518AA

After-Market Options (availability may vary by region)

Security	Kensington Lock	X	X	X	PC766A
	HP Business PC Security Lock	X	X	X	PV606AA
	HP Rear Port Controller Cover (USDT)	X			GJ121AA
	HP (CMT) Solenoid Lock and Hood			X	DE618A
	HP (SFF) Solenoid Lock Hood Sensor		X		GJ116AA
	HP 2008 Wall Mount/Security Sleeve (SFF)		X		GF344AA
	HP ProtectTools Version 4.0 (1 User)	X	X	X	FH974AA
	HP USB Smartcard Keyboard	X	X	X	ED707AA
Software	HP Client Configuration Manager, Premium Edition	X	X	X	T3488AA (use T3489AA for 1000 licenses)
	Altiris Client Management Suite Level 1 Includes: Altiris Deployment Solution Altiris Inventory Solution Altiris Application Metering Solution Altiris Carbon Copy Solution Altiris Software Delivery Solution Altiris Application Management Solution Altiris Patch Management Solution	X	X	X	DR605A (use DR606A for 1000+ licenses)
Brackets/Stands	HP Compaq Integrated Work Center Stand	X			GN783AA
	HP Tower Stand for USDT	X			GJ117AA
	HP Tower Stand for SFF		X		GJ118AA
Miscellaneous Accessories	HP Serial Port adapter kit		X	X	PA716A
	HP Parallel Port Adapter		X	X	KD061AA
	HP 5.25” Blank Bezel Kit (50 pack)		X	X	DC177B
	HP FireWire (IEEE 1394) PCI Card		X	X	PA997A
Graphics – Cables	HP DMS59 DVI Dual-head Connector Cable		X	X	DL139A
	HP DVI to DVI Cable		X	X	DC198A
	HP ADD2 SDVO DVI-D Adapter		X	X	DY674A
	HP DisplayPort to VGA Adapter	X	X	X	AS615AA
	HP DisplayPort To DVI-D Adapter	X	X	X	FH973AA

Unit Environment and Operating Conditions	Ultra-slim Desktop	Small Form Factor	Convertible Minitower
General Unit Operating Guidelines • Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range. • Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow. • Never restrict airflow into the computer by blocking any vents or air intakes. • Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air. • Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow. • If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.			
Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)		
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)		
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)		
* Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.			

Power Supply	Ultra-slim Desktop	Small Form Factor	Convertible Minitower
Standard Efficiency	N/A	240W standard efficiency active PFC	365W standard efficiency active PFC
Energy Efficient	135W 87% efficient active PFC (external)	240W 85% efficient active PFC	365W 85% efficient active PFC
Operating Voltage Range	90 – 264 VAC	90 – 264 VAC	90 – 264 VAC
Rated Voltage Range	100 – 240 VAC	100 – 240 VAC	100 – 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz
Rated Input Current	N/A	4A	6A
Rated Input Current with Energy Efficient* Power Supply	1.5A	3.5A	5A
Current Leakage (NFPA 99)	< 275 µA	< 275 µA	< 450 µA
System Heat Dissipation	N/A	Typical 198 btu/hr (50 kg-cal/hr) Maximum 1260 btu/hr (318 kg-cal/hr	Typical 222 btu/hr (56 kg-cal/hr) Maximum 1916 btu/hr (483 kg-cal/hr)
System Heat Dissipation with Energy Efficient* Power Supply	Typical 133 btu/hr (33.5 kg-cal/hr) Maximum 549 btu/hr (132 kg-cal/hr)	Typical 150 btu/hr (38 kg-cal/hr) Maximum 1024 btu/hr (258 kg-cal/hr)	Typical 171 btu/hr (43 kg-cal/hr) Maximum 1557 btu/hr (392 kg-cal/hr)
	Ultra-slim Desktop	**Small Form Factor**	**Convertible Minitower**
Power Supply Fan	N/A	80mm variable speed	92mm variable speed
FEMP Standby Power Compliant (<2W in S5 – Power Off)*	X	X	X

Power Consumption in ES Mode – Suspend to RAM (S3) (Instantly Available PC)	< 2.7W	< 2.7W	< 2.7W

* Energy efficient power supply is a requirement for ENERGY STAR qualification in conjunction with a select range of processors and modules; ENERGY STAR models branded HP Compaq dc7900e

ROM BIOS Information

Key features of the HP BIOS in the dc7900 include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Business desktop computer into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Select models feature either Intel Standard Manageability or Core 2 processor with vPro Technology.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- Security – HP BIOS Configuration for ProtectTools offers a robust and flexible set of security features to help the system administrator secure their systems from removal of sensitive data, and help prevent access by unauthorized users.
- Computrace agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (Flashbin), BIOS updates from within Windows (HPQFlash, SSM), HP Client Manager, and fail-safe recovery. In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website.

Additional HP BIOS Features

- Power-On password – Helps prevent an unauthorized user from powering on the system. After a TPM Basic User password is established in windows, the user or admin can require TPM hardware based authentication during the power-on process.
- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) – Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Compaq dc7900 models use ACPI to provide power conservation features.

Other Features	Description
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
SMBIOS Ver. 2.5	System Management BIOS, for system management information
Wired for Management Support	Intel-driven, industry-wide initiative to make Intel architecture-based PCs, servers and mobile computers more inherently manageable right out of the box and over the network
Dual-State Power Button	Power button acts as both an on/off button and suspend-to-sleep button

Technical Specifications

Serviceability Features of System		
Dual Color Power LED on Front of Computer (Indicates Normal Operations and Fault Conditions)		
Diagnostic LED Explanation Table	Number of 1-second red LED blinks followed by 2-second pause, then repeats: 2-processor thermal protection activated 3-processor not installed 4-power supply failure 5-memory error 6-video error 7-PCA failure (ROM detected failure prior to video) 8-invalid ROM, bootblock recover mode	
• System/Emergency ROM	• Flash ROM	• CMOS Battery Holder for easy Replacement
• Flash Recovery with Video Configuration Record SW	• 5 Aux Power LED on System PCA	• Processor ZIF Socket for easy Upgrade
• Over-Temp Warning on Screen (Requires IM Agents)	• Clear Password Jumper	• DIMM Connectors for easy Upgrade
• HP Backup and Recovery Manager	• Clear CMOS Button	• NIC LEDs (integrated) (Green & Amber)

Serviceability Features of Chassis		
• Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions	• Color coordinated cables and connectors	• Tool-less Hood Removal
• Front power switch	• System memory can be upgraded without removing the system board or any internal components	• Tool-less Hard Drive, CD & Diskette Removal
• Green Pull Tabs, and Quick Release Latches for easy Identification		
NOTE: Thumb screw release mechanism is used with the Ultra-slim Desktop chassis cover.		
Additional Features	**Description**	
Intel Standard Manageability **NOTE:** Requires the utilization of the integrated network connection.	Select models feature Intel's Standard Manageability technology including the following: **DASH 1.0** DASH compliance for support of industry standards. Support for profile updates. **Host VPN*** Support for local management VPN tunneling	
Intel Core 2 Processor with vPro Technology **NOTE:** Requires the utilization of the integrated network connection.	Select models feature Intel's Core 2 Processor with vPro Technology including the following: **Intel Advanced Management Technology (AMT) 5.0** • All Intel Standard Manageability technologies • Fast call for help – client outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection • Audit Logs – policy based log of AMT actions to deter rogue administrator actions • Microsoft NAP Support – allows AMT to gain access to a Microsoft NAP enabled 802.1x network OOB to enable OOB SW updates, inventories, remote diagnostics, etc.	
DASH 1.0 support (Desktop and Mobile Architecture for System Hardware)	A standards initiative for representing out-of-band management capability for computer systems. It is a secure, web-services based successor to ASF.	

Technical Specifications

ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
TXT (Trusted Execution Technology) and VT-d (Virtualized devices)	• TXT allows for secure management (via TPM) and measured launch of VMM, as well as teardown of secrets in unexpected reset case. TXT support provided in select Intel processors. • VT-d is a chipset technology that virtualizes directed I/O Together, TXT and VT-d may be used to support verified launch of a known trusted VMM that also may protect VMs from accessing each other's memory.
Computrace	Computrace agent support standard
Tower	Product can be oriented as a tower (in addition to desktop orientation)
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
Drive Self Tests (DPS)*	• Drive Protection System • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. • The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures.
DPS Access through F10 Setup during Boot	
SMART Technology* (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted • Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count • By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure • IOEDC: I/O Error Detection Circuitry • Detects errors in Read/Write buffers on HDD cache RAM • Interface in F10 setup for all dc7900 platforms provides confirmation of SMART IV support.
SMART I – Drive Failure Prediction	
SMART II – Off-Line Data Collection	
SMART III – Off-Line Read Scanning with Defect Reallocation	
SMART IV – End-to-End CRC for hard drives	
* This feature is inoperable when a RAID (Redundant Array of Independent Disks) configuration is enabled.	

Technical Specifications - Audio

High Definition Audio	**Type**	Integrated
	High Definition Stereo Codec	Yes – ADI 4-channel ADI 1884 codec
	Audio Jacks	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out * (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load)
	* Internal Speaker Amplifier is for Internal Speaker only. External Speakers need to be powered externally. Rear Line in audio port is re-taskable as Line-in or Microphone-in.	
	Multistreaming Capable	Multistreaming can be enabled in the ADI control panel to allow independent audio streams to be sent to/from the front and rear jacks.
	Sampling	8 kHz – 192 kHz
	Wavetable Syntheses (software)	Yes – Uses OS soft wavetable
	Analog Audio	Yes
	Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	1.5 W
	Internal Speaker	Yes
	External Speaker Jack (Line-Out)	Yes

HP Thin USB Powered Speakers	**On/Off/Volume Controls**	Right side of right speaker
	Power LED	Front of right speaker (green)
	Frequency response	FO to 20kHz
	Watts	2/3 watt (normal/maximum)
	Dimensions (H x W x D)	Speakers: 5.72 x 3.74 x 0.96 in (14.52 x 9.50 x 2.45 cm) per speaker
	Net weight	0.68 lbs (0.31kg)
	Environmental (all conditions non-condensing)	**Temperature** (operating) 14° to 104° F (-10° to 40° C) **Relative Humidity** (operating) 40% to 90%
	Speaker cable length	Input cord: 5.91 ft (1800mm±35mm) L-channel cord: 3.28 ft (1000mm±35mm) USB cord: 5.91 ft (1800mm±35mm)
	Color	HP Carbonite

Technical Specifications - Communications

Integrated Intel 82567LM Gigabit Network Connection	**Connector**	RJ-45	
	Controller	Intel 82567LM Gigabit platform LAN Connect Networking Controller	
	Memory	Integrated 96KbB on chip buffer memory	
	Data rates supported	10/100/1000 Mbps	
	Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3 ab and 802.3u compliant	
	Bus architecture	GLCI, LCI interface. Intel specific MAC to PHY interface	
	Data transfer mode	At gigabit GLCI (802.3 serdes) is for Data, LCI (parallel bus) for MDIO, at 10/100 LCI for both data and MDIO, GLCI is idle.	
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union	
	Power requirement	Require 3.3Vaux,1.8V and 1.0V or just 3.3V with integrated regulators Power consumption 1.16 Watts for 82566, whole LOM 2.53 Watts	
	ACBS	Intel Auto Connect Battery Saving feature	
	Boot ROM support	Yes	
	Network transfer mode	Full-duplex	
		Half-duplex (not available for the 1000BASE-T transceiver)	
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
		10BASE-T (full-duplex) 20 Mbps	
		100BASE-TX (half-duplex) 100 Mbps	
		100BASE-TX (full-duplex) 200 Mbps	
		1000BASE-T (full-duplex) 2000 Mbps	
	Environmental	**Operating temperature**	32° to 131°F (0° to 55° C) To 70° C for external regulator
		Operating humidity	85% at 131° F (55° C)
	Management capabilities	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic.	
	Alerting	ASF 2.0 support, AMT 3.0 support	

Intel Gigabit CT Desktop NIC	**Connector**	RJ-45
	Controller	Intel WG82574L Gigabit Ethernet Controller
	Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.1P, 802,1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI-E 1.0a
	Data path width	X1, 250 MB/s, Bi-directional interface
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power requirement	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps
		10BASE-T (full-duplex) 20 Mbps
		100BASE-TX (half-duplex) 100 Mbps
		100BASE-TX (full-duplex) 200 Mbps
		1000BASE-T (full-duplex) 2000 Mbps

Technical Specifications - Communications

	Environmental	**Operating temperature**	32° to 131°F (0° to 55° C)
		Operating humidity	85% at 131° F (55° C)
	Dimensions	4.75 x 2.25 x 0.8 in (12.1 x 5.7 x 2.0 cm)	
	Operating system driver support	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows XP Professional or Windows XP Home 32*. No driver is required for this device. Native support is provided by the operating system. Red Hat Linux 7.2, Linux 7.3 and Red Hat Enterprise Linux 3 * Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.	
	Management capabilities	WOL , PXE, DMI, WFM 2.0	
Intel Pro 1000 PT PCIe Gigabit NIC	**Connector**	RJ-45	
	Controller	Intel 82572EI Gigabit Ethernet Controller	
	Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers	
	Data rates supported	10/100/1000 Mbps	
	Compliance	IEEE 802.1P, 802,1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control	
	Bus architecture	PCI-E 1.0a	
	Data path width	X1, 250 MB/s, Bi-directional interface	
	Data transfer mode	Bus-master DMA	
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union	
	Power requirement	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T	
	Boot ROM support	Yes	
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI Bus)	
	Environmental	**Operating temperature**	32° to 131°F (0° to 55° C)
		Operating humidity	85% at 131° F (55° C)
	Dimensions	6.4 x 2.6 x 0.8 in (16.3 x 6.6 x 1.9 cm)	
	Management capabilities	WOL, PXE, DMI, WFM 2.0	
HP 802.11b/g/n Wireless PCIe x1 Card	**Dimensions (L x H)**	3.3 x 4.7 inches (8.5 x 12 cm)	
	Weight	0.08 pounds (40 g)	
	Controller	Ralink RT2790	
	System interface	PCIExpress x1	
	Network standard	802.11 b/g/n	
	Frequency band	2.400 - 2.497 GHz	
	Operating temperature	14° to 149°F, operating (–10° to 65°C, operating)	

Technical Specifications - Communications

Storage temperature	–40° to 176°F, non-operating (-40° to 80°C, non-operating)		
Humidity	10–90% operating 5–95% non-operating		
Operating voltage	3.3V +/- 9% 12V +/- 8%		
Power consumption	Platform/WLAN Mode	Power Consumption	
	Maximum Power Consumption	10 Watts	
	Transmit Only	4 Watts maximum averaged power over 1 second	
	Transmit Packet or Active Scanning	1000 mA peak current for 100 microseconds or longer	
	Receive Only Mode or Idle without IEEE PSP mode enabled	3 Watts maximum averaged over 1 second	
	Idle, with IEEE PSP mode enabled	1.0 Watts maximum averaged over 1 second	
	Transmit Disabled (turned off in software)	50 mW maximum, averaged over 1 second	
	Platform in S3 or S4 (power removed from Low Profile PCI Express Card)	5 mW maximum, averaged over 1 second	
Output power (approximately)	**802.11b modes**	**802.11g modes**	**EWC modes**
	+19 dBm +/- 1.0 dB maximum	+17 dBm +/- 1.0 dB maximum	+17 dBm +/- 1.0 dB maximum (total power in all transmit chains)
Receive sensitivity	**Mode**	**Data rate**	**Sensitivity**
	802.11b	1 Mbps	-94 dBm
	802.11b	11 Mbps	-85 dBm
	802.11g	6 Mbps	-91 dBm
	802.11g	18 Mbps	-85 dBm
	802.11g	48 Mbps	-75 dBm
	802.11g	54 Mbps	-72 dBm
	EWC (2.4 GHz)	6.5 Mbps	-87 dBm
	EWC (2.4 GHz)	54 Mbps	-82 dBm
	EWC (2.4 GHz)	81 Mbps	-78 dBm
	EWC (2.4 GHz)	162 Mbps	-74 dBm
	EWC (2.4 GHz)	270 Mbps	-68 dBm
	EWC (2.4 GHz)	300 Mbps	-64 dBm
Data transfer rate	**Data Rate (MCS)**	**Minimum Throughput**	
	1 Mbps (802.11 b)	700 kbps	
	2 Mbps (802.11 b)	1.4 Mbps	
	5.5 Mbps (802.11 b)	3.5 Mbps	
	11 Mbps (802.11 b)	5.9 Mbps	
	12 Mbps (802.11 g)	6 Mbps	
	18 Mbps (802.11 g)	9 Mbps	
	24 Mbps (802.11 g)	12 Mbps	
	36 Mbps (802.11 g)	18 Mbps	

		48 Mbps (802.11 g) 21 Mbps 54 Mbps (802.11 g) 22.5 Mbps 6.5 Mbps (20 MHz EWC) 4.5 Mbps 13 Mbps (20 MHz EWC) 9 Mbps 19.5 Mbps (20 MHz EWC) 13.5 Mbps 26 Mbps (20 MHz EWC) 18 Mbps 39 Mbps (20 MHz EWC) 27 Mbps 52 Mbps (20 MHz EWC) 36 Mbps 58.5 Mbps (20 MHz EWC) 40 Mbps 65 Mbps (20 MHz EWC) 45 Mbps 78 Mbps (20 MHz EWC) 54 Mbps 104 Mbps (20 MHz EWC) 72 Mbps 117 Mbps (20 MHz EWC) 81 Mbps 130 Mbps (20 MHz EWC) 91 Mbps 13.5 Mbps (40 MHz EWC) 8 Mbps 27 Mbps (40 MHz EWC) 16 Mbps 40.5 Mbps (40 MHz EWC) 24 Mbps 54 Mbps (40 MHz EWC) 32 Mbps 81 Mbps (40 MHz EWC) 48 Mbps 108 Mbps (40 MHz EWC) 64 Mbps 121.5 Mbps (40 MHz EWC) 72 Mbps 135 Mbps (40 MHz EWC) 81 Mbps
	Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption • AES: CCM • 802.1x authentication • WPA: 802.1x. WPA-PSK and TKIP • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5
	Antenna	HP part number 497792-001
	Certifications	Wi-Fi certified
	Certifications for use by country	United States, Canada, Peru, Taiwan
Intel WiFi Link 5100 a/b/g/n (USDT) Wireless NIC	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n (draft 2.0)*

Technical Specifications - Communications

	* The specifications for 802.11n draft 2.0 are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11n WLAN devices. In countries where n draft 2.0 is not allowed, this capability is not enabled.
Interoperability	Wi-Fi certified (802.11abg only) Cisco Compatible Extensions Program compliant (802.11abg only) with Microsoft Windows Vista and XP Tested with wireless access points from several major manufacturers
Frequency Band	2.4 GHz and 5 GHz
Antenna Structure	1 transmit; 2 receive (1x2)
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n (draft): 66 possible data rates, ranging from 6 Mbps to 300 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n (draft) specification
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
Security[1]	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128, 192, and 256 bits), 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, LEAP, EAP-FAST. Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows Vista and XP only.
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power (for CCK)[2]	15 dBm
Output Power (for OFDM; power varies by data rate)[2]	15 dBm
Power Consumption	Transmit: 2.3 Watts (average, with one spatial streams) Receive: 1.9 Watts (average with two receive chains) Idle mode[3]: 30 mW (average) Radio off: 20 mW (max)
Power Management	ACPI compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[4]	300 Mbps: -68 dBm, 54 Mbps: -74 dBm, 6 Mbps: -90 dBm
Antenna Connections	3 U.FL type connectors, 50 ohm nominal impedance
Range	802.11 a – Typical (@6 Mbps): 600 feet – Outdoor Open Area; 150 feet – Indoor, Office environment 802.11 b – Typical (@1 Mbps): 1200 feet – Outdoor Open Area; 300 feet – Indoor, Office environment 802.11 g – Typical (@1 Mbps): 1200 feet – Outdoor Open Area; 300 feet – Indoor, Office environment

Technical Specifications - Communications

Form Factor	PCI-Express MiniCard	
Weight	0.013 lb (6 g)	
Dimensions	0.19 x 1.2 x 2.0 in (4.75 x 29.85 x 50.8 mm)	
Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%	
Temperature	Operating Non-operating	32° to 176° F (0° to 80° C) –40° to 176° F (–40° to 80° C)
Humidity	Operating Non-operating	10% to 90% (non-condensing) 5% to 90% (non-condensing)
Altitude	Operating Non-operating	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
Configuration Utility[5]	Microsoft Windows XP Choice of Configuration Utility: • Microsoft Windows XP Wireless Network Connection Manager • Intel PROSet for Microsoft Windows XP (required for Cisco Compatible Extensions support) Microsoft Windows Vista • Microsoft Windows Vista Wireless Network Connection Manager. • Intel IHV extensions for Windows Vista available to support Cisco Compatible Extensions.	

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. In Power Save Polling mode and on battery power.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.

Agere 2006 PCI 56K International SoftModem

Data Transmission	Technology speeds: 56,000 Kbps maximum downstream data, controllerless

NOTE: 56 Kbps technology refers to download speeds only and requires compatible modems at server sites. Other conditions may limit modem speed. FCC limitations allow a maximum of 53 Kbps during download transmissions.

Data Speeds	(Upload only) 33,600/31,200/28,800/26,400/21,600/19,200/16,800/14,400/12,000/9,600/7,200/4,800/2,400/1,200/300
Data Standards	ITU-T V.90, ITU-T, ITU-T V.34, V.44, V.42, V.42bis21, V.32bis, Bell 212A, and Bell 103
Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/1,200/300 b/s
Fax Mode Capabilities	ITU-T T.31 class 1 FAX, V. 17, V.29, V.27ter, and V.21 Channel 2
Error Correction and Data Compression	V.44, 42bis, V.42 and MNP2-5
Power Management	ACPI; PPMI 1.1 and wake support with PME and Vaux; meets PCI 2.3 requirements and PC 2001 requirements
Upgradeability	Driver upgradeable for future enhancements
Video	ITU-T V.80 video ready interface

Technical Specifications - Communications

	Other	TIA/EIA 602 standard AT command set Integrated DTE interface with speeds of up to 115.2 Kbps, parallel 16550a UART-compatible interface Optional ring wakeup signal
	Operating Temperature	32° to 158° F (0° to 70° C)
	Operating Humidity	20% to 90%, non-condensing
	Power	Requires a 3.3-V auxiliary power rail on PCI bus Uses only one PCI load (i.e., one grant/request pair), one shared IRQ, one electrical load
	Chipset	Agere Systems SV92PL – Integrated PCI interface with 5-V tolerant buffers and CardBus support
	Dimensions (L X H)	Complies with PCI low profile specifications-6.7 x 2.3 in (17.0 x 5.8 cm) and supports high- and low-profile brackets
	Connection	Single RJ-11 connector
	Other Features	Digital line protection, call progress monitoring via on-board piezo device, support for high profile and low profile brackets, PnP ID support
	Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark
	EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8
	Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals Not available in Korea or the Republic of South Africa.
	Health	Bare PCB material compliant to 94V-0 or better (marked as such)
	Other	PC 2001 compliant, PCI version 2.3, WHQL approved; ACPI compliant
LSI PCIe x1 56K International SoftModem	**Data Transmission**	Technology speeds: 56,000 Kbps maximum downstream data, controllerless **NOTE:** 56 Kbps technology refers to download speeds only and requires compatible modems at server sites. Other conditions may limit modem speed. FCC limitations allow a maximum of 53 Kbps during download transmissions.
	Data Speeds	(Upload only) 33,600/31,200/28,800/26,400/21,600/19,200/16,800/14,400/12,000/9,600/7,200/4,800/2,400/1,200/300
	Data Standards	ITU-T V.90, ITU-T, ITU-T V.34, V.44, V.42, V.42bis21, V.32bis, Bell 212A, and Bell 103
	Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/1,200/300 b/s
	Fax Mode Capabilities	ITU-T T.31 class 1 FAX, V. 17, V.29, V.27ter, and V.21 Channel 2
	Error Correction and Data Compression	V.44, 42bis, V.42 and MNP2-5
	Power Management	PCI Bus Power Management Interface Specification (PCI-PM) Revision 1.2, Appendix A. D0, D3hot, and D3cold. Wake on Ring state when in D3cold. If the power management event (PME) feature is enabled in D3cold, a modem can wake the system via WAKE# (WAKEN) or beacon. Meets PCI Express 1.1 standard.
	Upgradeability	Driver upgradeable for future enhancements
	Video	ITU-T V.80 video ready interface

Technical Specifications - Communications

Other	TIA/EIA 602 standard AT command set
	Integrated DTE interface with speeds of up to 115.2 Kbps, parallel 16550a UART-compatible interface
	Optional ring wakeup signal
Operating Temperature	32° to 158° F (0° to 70° C)
Operating Humidity	20% to 90%, non-condensing
Power	Requires a 3.3-V auxiliary power rail on PCI express bus
	Uses only one PCI express load (i.e., one grant/request pair), one shared IRQ, one electrical load
Chipset	LSI SV92EX – Integrated PCI interface with 3.3-V tolerant buffers and CardBus support
Dimensions (L X H)	Complies with PCI express low profile specifications-—6.7 x 2.3 in (17.0 x 5.8 cm) and supports high- and low-profile brackets
Connection	Single RJ-11 connector
Other Features	Digital line protection, call progress monitoring via on-board piezo device, support for high profile and low profile brackets, PnP ID support
Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark
EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8
Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals Not available in Korea or the Republic of South Africa.
Other	The SV92EX device is packaged in a 32-pin micro leadless chip carrier (MLCC). The SV92EX is fully compliant with the PCI Express revision 1.1 specification. WHQL approved; ASPM compliant.

Technical Specifications - Hard Drives

2.5” 7200 RPM Serial ATA Hard Drives	**250 GB**	**Capacity**	250,059,350,016 bytes	
		Height (Nominal)	0.374 in (9.5 mm)	
		Width (Nominal)	Media diameter: 2.5 in (63.5 mm)	
			Physical size: 2.75 in (70 mm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Cache	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
			Average	12 ms
			Full-Stroke	22 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	488,397,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	160 GB	**Capacity**	160,041,885,696 bytes	
		Height (Nominal)	0.374 in (9.5 mm)	
		Width (Nominal)	Media diameter: 2.5 in (63.5 mm)	
			Physical size: 2.75 in (70 mm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Cache	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
			Average	12 ms
			Full-Stroke	22 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	312,581,808	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	80 GB	**Capacity**	80,026,361,856 bytes	
		Height (Nominal)	0.374 in (9.5 mm)	
		Width (Nominal)	Media diameter: 2.5 in (63.5 mm)	
			Physical size: 2.75 in (70 mm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Cache	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
			Average	12 ms
			Full-Stroke	22 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	156,301,488	
		Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

3.5" 7200 RPM Serial ATA Hard Drives	**500 GB**	**Capacity**	500,107,862,016 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
			Average	11 ms
			Full-Stroke	21 ms
		Rotational Speed	7,200 RPM	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	250 GB	**Capacity**	250,059,350,016 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
			Average	8.5 ms
			Full-Stroke	18 ms
		Rotational Speed	7,200 RPM	
		Logical Blocks	488,397,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	160 GB	**Capacity**	160,041,885,696 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
			Average	9.3 ms
			Full-Stroke	18 ms
		Rotational Speed	7,200 RPM	
		Logical Blocks	312,581,808	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	80 GB	**Capacity**	80,026,361,856 bytes	

	Height	1 in (2.54 cm)	
	Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2.0 ms
		Average	9.3 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 RPM	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131° F (5° to 55° C)	
10,000 RPM Serial ATA Hard Drives	**160 GB**		
	Capacity	160,041,885,696 bytes	
	Height	1 in (2.54 cm)	
	Width	Media diameter: 3.0 in (7.62 cm) Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
	Cache	16 Mbytes	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
		Average	4.6 ms
		Full-Stroke	10.2 ms
	Rotational Speed	10,000 RPM	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	80 GB		
	Capacity	80,026,361,856 bytes	
	Height	1 in (2.54 cm)	
	Width	Media diameter: 3.0 in (7.62 cm) Physical size: 4 in (10.2 cm)	
	Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
	Cache	16 Mbytes	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
		Average	4.6 ms
		Full-Stroke	10.2 ms
	Rotational Speed	10,000 RPM	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131° F (5° to 55° C)	

Integrated Intel Graphics Media Accelerator 4500

3D/2D Controller	Microsoft DirectX® 10 based with support for Pixel Shader 3.0
VGA Controller	Integrated
DisplayPort	Integrated, Multimode capable; supports HDCP
Bus Type	PCI Express™ x16
RAMDAC	Integrated, 350 MHz
Memory	Graphics memory is shared with system memory. Graphics memory usage varies depending on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content. For Vista, use of PAVP heavy mode preallocates an additional 96MB. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.

Windows XP Memory Usage:

Total System Memory	Pre-Allocated (MB)	DVMT (MB)
.5GB	32	128
1.0GB	32	512
1.5GB	32	768
2 GB & more	32	1024

Windows Vista Memory Usage:
(Assumes Management Engine , VT-d enabled and other memory allocated for other BIOS usage)

System Memory	PVAP	Avail System Memory (MB)	Total Avail GFX Memory (MB)	Dedicated Video Memory (MB)	System Video Memory (MB)	Shared System Memory (MB)
1 GB	Lite	952	252	32	96	124
	Heavy	856	294	122	6	166
2 GB	Lite	1976	764	32	96	636
	Heavy	1880	806	122	6	678
4 GB	Lite	4024	1759	32	96	1631
	Heavy	3928	1759	122	6	1631
6 GB	Lite	6072	1759	32	96	1631
	Heavy	5976	1759	122	6	1631
8 GB	Lite	8120	1759	32	96	1631
	Heavy	8024	1759	122	6	1631

Total Available GFX Memory: Total graphics memory available to the system as reported by the OS.

Dedicated Video Memory: Memory owned and locked for graphics use as reported by the OS. (Preallocated)

System Video Memory: System memory locked and dedicated for graphics use.

Shared System Memory: Memory dynamically allocated for Graphics use

HW Video Decode	Hardware Accelerated decode for MPEG2 encrypted video; support for PAVP Lite (default) and Heavy (or Paranoid) modes

Technical Specifications - Graphics

Maximum Color Depth	32 bits/pixel
Maximum Vertical Refresh Rate	85 Hz at up to 1920x1440, 75 Hz at 2048x1536. Varies with mode and configuration. See table below.
Multi-display Support	Dual monitor support facilitated via one VGA port and one DisplayPort integrated on the back plane of the system board and presented as part of the rear I/O set of interfaces. DVI supported via optional HP DisplayPort to DVI-D adapter.
Graphics/Video API Support	Microsoft DirectX® 10, OpenGL® 1.5 (OpenGL® 2.0 available in a driver update)

Resolutions Supported

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP.

	Maximum Refresh Rate (Hz)	
Resolution	**Analog Connection**	**Digital Connection**
640x480	**85**	**60**
800x600	**85**	**60**
1024x768	**85**	**60**
1280x720	**85**	**60**
1280x1024	**85**	**60**
1440x900	**75**	**60**
1600x1200	**85**	**60**
1680x1050	**75**	**60**
1920x1080	**85**	**60-R**
1920x1200	**85**	**60-R**
1920x1440	**85**	**N/A**
2048x1536	**75**	**N/A**
2560x1600	**N/A**	**60***

* Only supported when using a DisplayPort connection
NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

HP ADD2 SDVO PCIe x16 DVI-D Adapter

Models	HP ADD2 SDVO DVI-D Out Adapter
Form Factor	Low-profile card
DVI-D Connector	Digital connection only
Dual Head Support	Yes, when used with the integrated VGA connector
Display Devices Supported	HP L1740 HP L1940T HP L2045W HP LP1965

NOTE: These graphics adapters offer optimal performance with any display that meets applicable VESA standards.

Color Depth	All modes support 8-bpp, 16-bpp, and 24-bpp color depths
Host Interface Connector	Mechanically compliant with PCI-E standard Complies with the Intel ADD2 and Intel Serial Digital Video Output (SDVO) specifications
Dot Clock	165 MHz maximum
Display Modes	Supports display modes that require up to 165-MHz bandwidth on the link, as shown in the following table.

Technical Specifications - Graphics

Resolution		60-Hz LCD	60-Hz	75-Hz	85-Hz
Blanking		5% reduced	GTF	GTF	GTF
640 x 480	VGA	Yes	Yes	Yes	Yes
800 x 600	SVGA	Yes	Yes	Yes	Yes
1024 x 768	XGA	Yes	Yes	Yes	Yes
1280 x 1024	SXGA	Yes	Yes	No	No
1600 x 1200	UXGA	Yes	Yes	No	No

HP DisplayPort to VGA Adapter

Connectors	DisplayPort and VGA connector
Adapter length	8 in (20 cm)
Adapter weight	.1 lbs (.06 kg)
Option kit contents	HP DisplayPort to VGA Adapter, documentation
Maximum vertical refresh rate	85 Hz
Display support	162 MHz RAMDAC
Display max resolution	1600x1200

HP DisplayPort to VGA adapter display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP. Using the HP DisplayPort to VGA Adapter may require an update to the graphics driver installed on your system. To install the most up-to-date graphics driver go to: www.hp.com.

Resolution	Max refresh rate
640x480	85
800x600	85
1024x768	85
1280x720	85
1280x1024	85
1440x900	75
1600x1200	60
1680x1050	60
1920x1080	60-R
1920x1200	60-R

NOTE: 60-R denotes reduced blanking timings are used. Not all monitors support reduced blanking timing.

ATI Radeon HD 2400XT (256MB DH) PCIe Graphics Card

Bus type	PCI Express (x16 lanes)
Maximum vertical refresh rate	85 Hz
Display support	Integrated 400 MHz RAMDAC
Display max resolution	1900 x 1200 digital, 2048 x 1536 analog

ATI Radeon HD 2400XT (256MB DH) PCIe Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

Technical Specifications - Graphics

Resolution	Maximum Refresh Rate (Hz)	
	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	60*

* Only supported when using a dual-link DVI or DP connection
NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

Board display options Supports two displays via included DMS-59 to dual VGA cable or 2 DVI monitors via optional DMS-59 to dual DVI cable kit part number: DL139A. 4-pin mini-DIN S-video connector for TV output

Board configuration

Specification	Description
Graphics Chip	RV610
Core clock	650 MHz
Memory clock	500 MHz
Frame buffer	256 MB DDR2, 128 bit wide

Languages supported 24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish

Core power 21 W

Compliance standards EMC Emissions:

a. FCC Part 15, Subpart B – Unintentional Radiators, Class B Computing Devices for Home & Office Use
b. CISPR22: 1997/EN 55022:1998 – Class B – Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment
c. Canadian Standard ICES-003 is equivalent to CISPR22
d. Taiwanese Standard BSMI
e. Japanese VCCI
f. Australian C-Tick
g. Korean (MIC)

EMC Immunity:
CISPR 24:1997/EN 55024:1998 – Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement.

ATI Radeon HD 3470 (256MB SH) PCIe x16

Bus type	PCI Express (x16 lanes)
Maximum vertical refresh rate	85 Hz

Technical Specifications - Graphics

Graphics Card

Display support	Integrated 400 MHz RAMDAC
Display max resolution	2560x1600 digital, 2048 x 1536 analog

ATI Radeon HD 3470 (256MB SH) PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

Resolution	Maximum Refresh Rate (Hz)	
	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	60*

* Only supported when using a dual-link DVI or DP connection

NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

Board display options Supports two displays via the DisplayPort and DVI connectors

Board configuration	**Specification**	**Description**
	Graphics Chip	RV620
	Core clock	750 MHz
	Memory clock	500 MHz
	Frame buffer	256 MB DDR2, 64 bit wide

Languages supported 24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish

Operating systems support Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows XP Professional or Windows XP Home 32*.

* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

Linux x86 and x86_64 distributions using XFree86 or X.Org**.

** Linux drivers are available from ATI's website and may be available in a Linux distribution. Refer to the Open Source and Linux from HP website: http://www.hp.com/wwsolutions/linux/products/clients/ for support information.

Core power 22 W (max)

Dimensions (H x D) 2.71 in x 6.60 in (68.90 mm x 167.65 mm)

Weight 0.30 lb (134.3 g)

Technical Specifications - Graphics

Option kit contents

- ATI Radeon HD 3470 (256MB SH) PCIe x16 Graphics Card with full height bracket attached
- DVI to VGA adapter
- Software CD with graphics drivers
- Low profile bracket to convert the card for using in a low profile chassis
- Warranty documentation

Compliance standards EMC Emissions:

a. FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use
b. CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment
c. Canadian Standard ICES-003 is equivalent to CISPR22
d. Taiwanese Standard BSMI
e. Japanese VCCI
f. Australian C-Tick
g. Korean (MIC)

EMC Immunity:
CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.

ATI Radeon HD 3650 (512MB DH) PCIe x16 Graphics Card

Bus type	PCI Express (x16 lanes)	
Maximum vertical refresh rate	85 Hz	
Display support	Integrated 400 MHz RAMDAC	
Display max resolution	2560 x 1600 digital, 1920 x 1440 analog Supports two displays via included two DisplayPort and one Dual Link DVII connectors.	
Board configuration	**Specification**	**Description**
	Graphics Chip	RV635
	Core clock	600 MHz
	Memory clock	500 MHz
	Frame buffer	512 MB DDR2, 128 bit wide
Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish	
Core power	56 W	
Compliance standards	EMC Emissions: a. FCC Part 15, Subpart B – Unintentional Radiators, Class B Computing Devices for Home & Office Use b. CISPR22: 1997/EN 55022:1998 – Class B – Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment c. Canadian Standard ICES-003 is equivalent to CISPR22 d. Taiwanese Standard BSMI e. Japanese VCCI f. Australian C-Tick g. Korean (MIC)	

EMC Immunity:
CISPR 24:1997/EN 55024:1998 – Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement.

ATI Radeon HD 3650 (512MB DH) PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

Resolution	Maximum Refresh Rate (Hz)	
	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	60*

* Only supported when using a dual-link DVI or DP connection

NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

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ATI Radeon HD 4550 DH PCIe x16 Graphics Card

Input/Output connectors	DMS-59 S-video connector	
Board display options	Supports two displays via included DMS-59 to dual VGA cable or 2 DVI monitors via optional DMS-59 to dual DVI cable kit part number: DL139A. 4-pin mini-DIN S-video connector for TV output	
Board configuration	**Specification**	**Description**
	Graphics Chip	RV710
	Core clock	600 MHz
	Memory clock	800 MHz
	Frame buffer	256 MB DDR2, 64 bit wide
Bus type	PCI Express (x16 lanes)	
Maximum vertical refresh rate	85 Hz	
Display support	Integrated 400 MHz RAMDAC	
Display max resolution	1900 x 1200 digital, 2048 x 1536 analog	

ATI Radeon HD 4550 DH PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP.

Technical Specifications - Graphics

Resolution	Maximum Refresh Rate (Hz)	
	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	N/A

NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections.

Languages supported 24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish

Operating systems support Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows XP Professional or Windows XP Home 32*.

* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

Linux x86 and x86_64 distributions using XFree86 or X.Org**.

** Linux drivers are available from ATI's website and may be available in a Linux distribution. Refer to the Open Source and Linux from HP website: http://www.hp.com/wwsolutions/linux/products/clients/ for support information.

Core power 21 W

Option kit contents

- ATI Radeon HD 4550 DH PCIe x16 Graphics Card with full height bracket attached
- DMS 59 to dual VGA Y cable
- Software CD with graphics drivers
- Low profile bracket to convert the card for using in a low profile chassis
- Warranty documentation

Compliance standards EMC Emissions:
a) FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use
b) CISPR22: 1997/EN 55022:1998 – Class B – Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment
c) Canadian Standard ICES-003 is equivalent to CISPR22
d) Taiwanese Standard BSMI
e) Japanese VCCI
f) Australian C-Tick
g) Korean (KCC)

EMC Immunity:

CISPR 24:1997/EN 55024:1998 – Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement.

NVIDIA Quadro NVS 290 256MB PCIe Dual Head	**Form Factor**	Low Profile
	Bus Type	PCIe x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connector	DMS-59; includes one DMS-59 to Dual VGA cable. A DMS-59 to Dual DVI-I cable is available as an option.
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Integrated dual 400MHz
	Color planes	32-bit color buffer
	Overlay planes	Hardware supported
	nView architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.
	Multi-Monitor support	Dual monitor support
	DVI support	DMS-59 (to dual DVI-SL)
	High-definition Video Processor (HDVP)	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	Supported graphics APIs	OGL 2.1 & DX10 Support; Shader Model 4.0

NVIDIA Quadro NVS 295 256MB PCIe Graphics Card	**Form Factor**	2.731 inches (H) × 6.600 inches (L), Half-Height
	Graphics Controller	NVIDIA Quadro NVS 295 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connector	2 DisplayPort Comes with 2 DisplayPort to VGA Adapters **NOTE:** DisplayPort to DVI-D (Single Link) adapter available as an accessory
	Maximum Resolution	Two DisplayPort outputs drive two digital displays up to 2560 x 1600
	Display Output	• Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking • Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using optional DisplayPort to DVI-D (Single Link) adapter
	Supported Graphics APIs	OpenGL 3.0 DirectX 10.0
	Available Graphics Drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit)
	Power consumption	23 Watts

Technical Specifications - Input/Output Devices

USB Standard Keyboard	**Physical characteristics**	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	**Operating voltage**	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	USB Type A plug connector
		ESD	CE level 4, 15-kV air discharge
		EMI – RFI	Conforms to FCC rules for a Class B computing device
		Microsoft® PC 99 – 2001	Functionally compliant
	Mechanical	**Languages**	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 – 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	**Operating temperature**	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
	Kit contents	Keyboard, installation guide, warranty card, safety and comfort guide	

Technical Specifications - Input/Output Devices

PS/2 Standard Keyboard	**Physical characteristics**	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	**Operating voltage**	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	PS/2 6-pin mini din connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC 99 - 2001	Functionally compliant
	Mechanical	**Languages**	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	**Operating temperature**	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
HP USB Smartcard Keyboard	**Physical characteristics**	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
		Form factor	USB basic Smart Card keyboard
		Colors	Carbonite/Silver
		Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	**Operating voltage**	+ 5VDC ± 5%
		Power consumption	100-mA maximum (with four LEDs ON)
		System interface	USB Type A plug connector

	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	**Languages**	30+ available
	Keycaps	Low-profile design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	**Operating temperature**	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, JITC, EMV2000, USB-IF, FIPS 201	
SMARTCARD function	**Support**	All ISO 7816 smart cards
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)
	Chipset	SCM STCII
	Standard APIs supported	PC/SC, EMV2000, SET
	Power	USB Port Short circuit detection (protects smart card and reader) Power supply compliant with ISO7816 and EMV (5V, 60 mA) Supports 3-V and 5-V cards
	Power consumption	250-mA maximum draw (50 mA for the keyboard with three LEDs ON and 200-mA maximum startup current using a high-current, 60-mA smart card)

	Communication	**From card**	Programmable from 9,600 baud to 115,200 baud
		From computer	Up to 38,400 baud
	Landing mechanism	**Contact device**	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	USB communications through USB port SCM protocol Automatic card insertion/removal detection	
	Reader performance interface	USB connection	
	Electro-magnetic standards	**Europe**	89/336/CEE guideline
		USA	USAFCC part 15

HP USB PS2 Washable Keyboard	**Physical characteristics**	Keys	104 (US) Layout, 105 (EU) layout -- depending upon country
		Dimensions (L x W x H)	17.67x 6.62 x 1.38 in (449 x 168 x 35 mm)
		Weight	1.7 lb (0.77 kg) minimum
	Electrical	Operating voltage	+ 5VDC ±5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	USB Type A plug connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft® PC 99 - 2001	Functionally compliant
	Mechanical	Keycaps	Stepped -profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	7 ft (2.2 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-4° to 149° F (-20° to 65° C)
		Operating humidity	10% to 95% (non-condensing at ambient)
		Non-operating humidity	0% to 95% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence

	Approvals		UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X
	Ergonomic compliance		ANSI HFS 100, ISO 9241-4, and TUVGS
HP PS/2 Optical Scroll Mouse	**Dimensions** (H x L x W)		3.95 x 6.21 x 11.7 cm (1.56 x 2.44 x 4.61 in)
	Weight		4.44 oz (126 g)
	Environmental	**Operating temperature**	-32° to 104°F (0° to 40° C)
		Non-operating temperature	-4° to 140°F (-20° to 60° C)
		Operating humidity	10% to 90% (non condensing at ambient)
		Non-operating humidity	10% to 90% non condensing
		Operating shock	40 g, 6 surfaces
		Non-operating shock	80 g, 6 surfaces
		Operating vibration	2 g peak acceleration
		Non-operating vibration	4 g peak acceleration
		Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
	Electrical	**Operating voltage**	5 VDC ± 10%
		Power consumption	100mA
		System consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge
		EMI-RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC99 - 2001	Functionally compliant
	Mechanical	**Resolution**	400 ± 20% DPI
		Tracking speed	10 in/s (25.4 cm/s) maximum
		Acceleration	100 in/s/s (2.54 m/s/s)
		Switch actuation	61 g nominal peak force
		Switch life	3,000,000 operations (using Hasco modified tester)
		Switch type	Low force micro-switches
		Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
		Cable length	6 ft (1.8 m)
		Microsoft PC99 - 2001	Mechanically compliant
	Scroll wheel	**Width**	8 mm
		Diameter	1.01 in (25.6 mm)
		Maximum rotation speed	48 rats/sec
		Switch type	Light force micro-switch
		Switch life	1 million operations
		Mechanical life	Minimum 200,000 revolutions
	Regulatory approvals	**Compliant**	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC

Technical Specifications - Input/Output Devices

HP USB Optical Scroll Mouse	**Dimensions** (H x L x W)	1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)
	Weight	0.27 lb (0.12 kg)
	Cable length	72.8 in (185 cm)
	System requirements	Microsoft Windows 95, 98, 2000, Me, XP and Vista Available USB port

Technical Specifications - Optical Storage

HP SATA SuperMulti LightScribe DVD Writer Drive	**Height**	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Disc capacity	8.5 GB DL or 4.7 GB standard	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	
	Write speeds	**DVD-RAM**	Up to 12X
		DVD+R	Up to 16X
		DVD+RW	Up to 8X
		DVD+R DL	Up to 8X
		DVD-R DL	Up to 8X
		DVD-R	Up to 16X
		DVD-RW	Up to 6X
		CD-R	Up to 48X
		CD-RW	Up to 32X
	Read speeds	**DVD-RAM**	Up to 12X
		DVD+RW, DVD-RW, DVD+R DL, DVD-R DL	Up to 8X
		DVD-ROM DL	Up to 8X
		DVD-ROM, DVD+R, DVD-R	Up to 16X
		CD-ROM, CD-R	Up to 48X
		CD-RW	Up to 32X
	Access time (typical reads, including settling)	**Random**	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
		Cache Buffer	2 MB (minimum)
		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
	Power	**Source**	SATA DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
			12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
			12 VDC (< 600 mA typical, 1400 mA maximum)
	Environmental conditions (operating - non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 90%
		Maximum Wet Bulb Temperature	86° F (30° C)

Technical Specifications - Optical Storage

SATA DVD-ROM Drive	**Height**	5.25-inch, half-height, tray-load		
	Orientation	Either horizontal or vertical		
	Interface type	SATA/ATAPI		
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)		
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
	Weight (max)	2.6 lb (1.2 kg)		
	Read speeds	**DVD+R/-R/+RW/ -RW/+R DL /-R DL**	Up to 8X	
		DVD-ROM	Up to 16X	
		DVD-RAM	Up to 4X	
		CD-ROM, CD-R	Up to 48X	
		CD-RW	Up to 32X	
	Removable Storage - Media Compatibility - DVD-ROM	**Media**	**Read**	**Write**
		CD-ROM	Yes	No
		CD-R	Yes	No
		CD-RW	Yes	No
		DVD-ROM	Yes	No
		DVD-ROM DL	Yes	No
		DVD-RAM	Yes	No
		DVD+R	Yes	No
		DVD+R DL	Yes	No
		DVD+RW	Yes	No
		DVD-R	Yes	No
		DVD-RW	Yes	No
		DVD-R DL	Yes	No
	Access times (typical reads, including setting)	**Random**	DVD: < 140 ms (typical), CD: < 125 ms (typical)	
		Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)	
		Cache Buffer	2 MB (minimum)	
		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)	
	Power	**Source**	SATA DC power receptacle	
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p	
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC -< 600 mA typical, < 1400 mA maximum	
	Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)	
		Relative Humidity	10% to 90%	
		Maximum Wet Bulb Temperature	86° F (30° C)	

SATA Slim SuperMulti LightScribe DVD Writer Drive	**Height**	12.7mm height
	Orientation	Either horizontal or vertical
	Interface type	SATA/ATAPI

Technical Specifications - Optical Storage

Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard	
Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
Weight (max)	0.42 lb (190 g)	
Write speeds	**DVD-RAM**	Up to 5X
	DVD-R DL	Up to 4X
	DVD+R	Up to 8X
	DVD+RW	Up to 4X
	DVD+R DL	Up to 4X
	DVD-R	Up to 8X
	DVD-RW	Up to 6X
	CD-R	Up to 24X
	CD-RW	Up to 16X
Read speeds	**DVD-RAM**	Up to 5X
	DVD-RW, DVD+RW	Up to 8X
	DVD-R DL, DVD+R DL	Up to 6X
	DVD+R, DVD-R	Up to 8X
	DVD-ROM DL, DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	**Random**	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Stop Time	< 4 seconds
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s - default)
Power	**Source**	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
		12 VDC (< 600 mA typical, 1400 mA maximum)
	Total Drive Power (standby mode)	< 2.5 Watt
Audio output	**Line-Out**	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental conditions (operating - non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

Technical Specifications - Optical Storage

SATA CD-RW/DVD-ROM Combo Slim Drive	**Height**	12.7mm height slim CD-RW	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM)	
	Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
	Weight (max)	0.42 lb (190 g)	
	Write speeds	**CD-R**	Up to 24X
		CD-RW	Up to 24X
	Read speeds	**DVD+R/-R/+RW/ -RW/+R DL /-R DL**	Up to 4X
		DVD-ROM	Up to 8X
		CD-ROM, CD-R	Up to 24X
		CD-RW	Up to 24X
	Access time (typical reads, including settling)	**Random DVD**	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Random CD	DVD: < 250 ms (typical), CD: < 210 ms (typical)
		Cache Buffer	2 MB (minimum)
		Data Transfer Modes	ATA PIO mode 4); ATA Multi-word DMA mode 2; ATA UltraDMA mode 0; ATA UltraDMA mode 1, mode 2; ATA UltraDMA Mode 3 (default)
	Power	**Source**	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, < 1600 mA maximum)
		Total Drive Power (standby mode)	< 2.5 Watt
	Audio output level	0.7 Vrms (typical)	
	Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	5% to 85%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)

Technical Specifications - Optical Storage

SATA DVD-ROM Slim Drive	**Height**	12.7mm	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
	Weight (max)	0.42 lb (190 g)	
	Read speeds	**DVD+R/-R/+RW/ -RW/+R DL /-R DL**	Up to 4X
		DVD-ROM	Up to 8X
		CD-ROM, CD-R	Up to 24X
		CD-RW	Up to 24X
	Access time (typical reads, including settling)	**Random DVD**	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Random CD	DVD: < 250 ms (seek), CD: < 210 ms (seek)
		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s)
	Power	**Source**	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum
		Total Drive Power (standby mode)	< 2.5 Watt
	Audio output	**Line-Out**	0.7 VRMS
		Signal-to-Noise Ratio	74 dB
		Channel Separation	65 dB
	Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	5% to 85%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)

HP 22-in-1 (with 1394) Media Card Reader	**USB Interface**	USB 2.0 High-speed interface **NOTE:** Requires the USB cable to be connected to the internal USB 2.0 port or a USB 2.0 PCI card.
	1394 Interface	Two IEEE-1394a external ports; 1 IEEE-1394a internal port (connects to the pass through cable on the media card reader)
	Advance protocol support	• Supports hardware ECC (Error Correction Code) function • Supports hardware CRC (Cyclic Redundancy Check) function • Supports MS 4-bit parallel transfer mode • Supports MS-PRO 4-bit parallel transfer mode • Supports MS PRO-HG Duo 4-bit parallel transfer mode • Supports SD 4-bit parallel transfer mode • Supports high-speed 50Mhz SD 4-bit card (version 2.0) • Supports high-speed 52Mhz MMC 8-bit card (version 4.2) • Supports CF v4.0 with PIO mode 6 and Ultra DMA mode
	Supported media type	• CompactFlash Type I • CompactFlash Type II • Microdrive • MultiMediaCard (MMC) • Reduced Size MultiMediaCard (RS MMC) • MultiMediaCard 4.2 (MMC Plus, including MMC Plus HC) • Reduced Size MultiMediaCard 4.2 (MMC Mobile, including MMC Mobile HC) • Secure Digital Card (SD) • Secure Digital High Capacity (SDHC) • miniSD • miniSD High Capacity • Micro SD (T-Flash) • Micro SD HC • Memory Stick • Memory Stick Select • Memory Stick Duo (MS Duo) • Memory Stick PRO (MS PRO) • Memory Stick PRO Duo (MS PRO Duo) • Memory Stick PRO-HG Duo • MagicGate Memory Stick (MG) • MagicGate Memory Stick Duo • xD-Picture Card
	Supported media type with card adapter	• Memory Stick Micro (M2) • MMC Micro
	Environmental	**Operational Environmental Extremes**: Test Parameters/Conditions - Power applied, unit operating on system ±5% nominal supply voltage. 10°C 10% R.H. ? 24 hours 10°C 90% R.H. ? 24 hours 20°C 90% R.H. ? 24 hours 30°C 90% R.H. ? 24 hours 40°C 90% R.H. ? 24 hours 50°C 90% R.H. ? 24 hours 50°C 10% R.H. ? 24 hours

	Storage Environmental Extremes	Test Parameters/Conditions 140°F (60°C) @ 80% R.H. for 96 hours -22°F (-30°C) @ 20% R.H. for 48 hours No power applied Delta °C < 1.0°C/min Delta % R.H. < 1.5% R.H./min
Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3 FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUV-T	

Eco-Label Certifications & declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- US ENERGY STAR ®
- IT ECO declaration
- EPEAT – Gold[1]

NOTE: This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'

[1] EPEAT certification is conditional upon ENERGY STAR qualification. Only dc7900e models which qualify for ENERGY STAR will be certified EPEAT – Gold

Ultra-Slim Desktop

System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Ultra-slim Desktop model is based on a typically configured product

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	40.68 W	40.07 W	39.94 W
Sleep (Energy Star low power mode)	2.95 W	2.96 W	2.96 W
Off	1.67 W	1.68 W	1.68 W

Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	139 BTU/hr	137 BTU/hr	137 BTU/hr
Sleep	10 BTU/hr	10 BTU/hr	10 BTU/hr
Off	6 BTU/hr	6 BTU/hr	6 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.1	23
Fixed Disk (random writes)	3.1	24
Optical Drive (sequential reads)	4.8	42

Batteries

This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000ppm by weight.

Battery size: CR2032 (coin cell)

Technical Specifications - Environmental Data

Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level[1], see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by wt.)
- This product is 90.6% recyclable when properly disposed of at end of life.

Packaging Materials

- External:
  - Corrugated carton – 1476 g
  - Polyethylene low density – 105 g
  - Wood(pallet) – 13,000 g
- Internal:

- The EPE foam packaging material is made from 100% recycled content.
- The corrugated paper packaging materials contains at least 100% recycled content.

[1] EPEAT certification is conditional upon ENERGY STAR qualification. Only dc7900e models which qualify for ENERGY STAR will be certified EPEAT – Gold.

Small Form Factor

System Configuration The configuration used for the Energy Consumption and Declared Noise Emissions data for the Small Form Factor Desktop model is based on a typically configured product

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	55.58 W	56.06 W	58.60 W
Sleep (Energy Star low power mode)	2.47 W	2.76 W	2.51 W
Off	1.23 W	1.51 W	1.26 W

Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	190 BTU/hr	192 BTU/hr	200 BTU/hr
Sleep	8 BTU/hr	9 BTU/hr	8 BTU/hr
Off	4 BTU/hr	5 BTU/hr	4 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.

Technical Specifications - Environmental Data

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

"Typical Configuration" with 7200 rpm HDD

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.7	27
Fixed Disk (random writes)	3.8	28

Configuration with optional 10,000 rpm HDD

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.8	27
Fixed Disk (random writes)	4.2	32

Batteries

This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000ppm by weight.

Battery size: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level[1], see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by wt.)
- This product is 93.4% recyclable when properly disposed of at end of life.

Packaging Materials

- External:
  - Corrugated – 1736 g
  - Polyethylene low density foam – 35 g
- Internal:
  - EPE-Expanded Polyethylene – 293 g

- The EPE foam packaging material is made from 0% recycled content.
- The corrugated paper packaging materials contains at least 25% recycled content.

[1] EPEAT certification is conditional upon ENERGY STAR qualification. Only dc7900e models which qualify for ENERGY STAR will be certified EPEAT – Gold.

Convertible Minitower

Technical Specifications - Environmental Data

System Configuration The configuration used for the Energy Consumption and Declared Noise Emissions data for the Convertible Mini tower Desktop model is based on a typically configured product

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	56.815 W	56.054 W	57.984 W
Sleep (Energy Star low power mode)	2.319 W	2.626 W	2.296 W
Off	1.097 W	1.31 W	1.075 W

Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	194 BTU/hr	192 BTU/hr	198 BTU/hr
Sleep	8 BTU/hr	9 BTU/hr	7 BTU/hr
Off	4 BTU/hr	5 BTU/hr	4 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.7	22
Fixed Disk (random writes)	3.8	22

Configuration with optional 10,000 rpm HDD

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.9	21
Fixed Disk (random writes)	4.4	25

Batteries This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000ppm by weight.

Battery size: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level[1], see www.epeat.net
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
-

- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by wt.)
- This product is 96.6% recyclable when properly disposed of at end of life.

Packaging Materials

- External:
  - Corrugated carbon – 1687.37 g
  - Polyethylene low density solid – 63.5 g
- Internal:
  - EPE-Expanded Polyethylene – 308 g

- The EPE foam packaging material is made from 0% recycled content.
- The corrugated paper packaging materials contains at least 25% recycled content.

[1] EPEAT certification is conditional upon ENERGY STAR qualification. Only dc7900e models which qualify for ENERGY STAR will be certified EPEAT – Gold.

Ultra-Slim Desktop, Small Form Factor, Convertible Minitower

RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in

packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

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